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Vol. 10, No. 10, pp. 197-406, pls. 6-10, 3 text figs. October 31, 1913

AN ACCOUNT OF THE BIRDS AND MAMMALS
OF THE SAN JACINTO AREA OF
SOUTHERN CALIFORNIA

WITH REMARKS UPON THE BEHAVIOR OF
GEOGRAPHIC RACES ON THE MARGINS
OF THEIR HABITATS

BY
J. GRINNELL AND H. S. SWARTH

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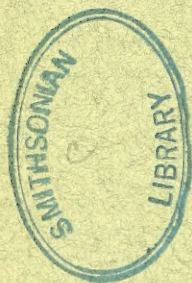
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(Contribution from the Museum of Vertebrate Zoology of the University of California)

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INTRODUCTION

The first field work formally undertaken by the Museum of Vertebrate Zoology, after its inauguration in March, 1908, was centered in the San Jacinto Mountains of southern California. The contiguous regions on both the desert and Pacific sides were included in the explorations. This program was settled upon in part because this particular area remained at that time the least known part of southern California as regards its vertebrate fauna, and in part because there were likely to be presented here in accentuated degree peculiar distributional features dependent upon the great altitude of the mountain itself and the close juxtaposition on either hand of the sharply contrasted faunas of the desert and coast regions.

Furthermore, there were already available the collections and information resulting from the senior author's work in the San Bernardino Mountains, since published (Grinnell, 1908). This afforded a basis for a systematic plan of action looking towards verification of certain previously entertained hypotheses.

During the five years' interim, from the date of concluding the San Jacinto field work until the final compilation of the present report, much pertinent data has been secured from studies of related areas. These additional sources of information have enabled us to interpret the distributional problems concerned with the San Jacinto area as we could not have done otherwise. All of this contributory faunistic work, as well as the main undertaking, has been made possible through the continued financial support provided by Miss Annie M. Alexander, who has thus shown in an effective way her belief in the ultimate value of efforts expended in this line of scientific inquiry.

The San Jacinto Mountains form a sharply segregated section in the series of high ranges which cut off the fertile coast valleys of southern California from the arid deserts of the interior. The San Bernardino Mountains lie directly to the northward, with the gap formed by San Gorgonio Pass between. To the southward is the Santa Rosa range, separated but slightly from the main San Jacintos, and farther south are various smaller mountain chains (see profile, plate 7).

Practically all the drainage on the western side of the San Jacintos goes into the cañon formed by the San Jacinto River. From Hemet Lake down, this stream occupies a rough, narrow and rather steep cañon; above the lake there is no running stream, and the cañon opens out into the broad, level Hemet Valley, extending nearly to Vandeventer Flat. On the east side of the range is Palm Cañon extending along almost the entire desert base of the mountains and emptying onto the Colorado Desert near Palm Springs; at the south it heads just below Vandeventer Flat. The latter point is thus at one apex of a rudely defined triangle, the three sides of which are formed by San Jacinto River Cañon, Palm Cañon, and San Gorgonio Pass. The main mass of the San Jacinto Mountains, including all the higher parts of the range, is contained within this triangle.

In the course of our season's work practically the entire outline of this triangular area was traversed, and many collecting stations were established within its borders. Some work was done also at points outside the triangle, for example, in the Santa Rosa Mountains.

During the summer of 1908 two parties engaged in the field exploration here concerned. The two authors of the present paper entered the region from the west, and began work on the Pacific side of the mountain. Our stations were as follows:

Hemet, May 18	Tahquitz Valley, July 19 to
Kenworthy, May 19 to May 25,	August 5
June 2 to June 11	Hemet Lake, August 6 to August
Dos Palmos Spring, May 25 to	16
June 2	Thomas Mountain, August 16 to
Palm Cañon, June 11 to June 18	August 20
Carrizo Creek, June 18 to June 23	Carrizo Creek, August 22 to
Garnet Queen Mine, June 25 to	August 27
June 28	Vallevista, August 29 to Septem-
Santa Rosa Peak, June 28 to July 1	ber 5
Strawberry Valley, July 3 to July	

Only the junior author remained in the field until the last indicated date. The senior author left July 31; and Harry E. Wilder, of Riverside, took his place August 15. During the last visit to Carrizo Creek, the party was further augmented by

George Ferguson, of Colton, and Harry G. Rising of Los Angeles. Although in the mountains merely for pleasure, they rendered valuable assistance. During June the writers were accompanied by L. Hollister Jones, as assistant, and during June and July by Fordyce Grinnell, Jr.

Walter P. Taylor and Charles H. Richardson, Jr., with Charles L. Camp as assistant during a portion of the season, penetrated the region from the north. Their collecting stations, with the time spent at each, are as follows:

Cabazon, May 1 to May 25	Schain's Ranch, June 16 to June 30
Snow Creek, May 25 to June 3	Fuller's Mill, June 30 to July 5
Whitewater, June 3 to June 6	Round Valley, July 6 to July 12
Banning, June 6 to June 16	

The party entering upon the mountains from the west traveled to Kenworthy by wagon. From this point as a base, pack animals were used to reach the stations in Palm Cañon and the Santa Rosa Mountains. Strawberry Valley, reached by wagon, served as a starting point for pack trips to Tahquitz Valley, Round Valley, and the summit of San Jacinto Peak. In San Geronio Pass the Southern Pacific railroad was used to reach the series of collecting stations nearby. From Banning, Schain's Ranch and Fuller's Mill were reached by wagon. The latter point was used as a base from which pack trips were made to higher parts of the mountains.

The objects of all this field work were to gather collections of mammals, birds and reptiles, and to record all information practicable to obtain in regard to them, especially that in line with problems in distribution. The specimens obtained by the Museum parties number: mammals, 1099; birds, 1533; sets of birds' eggs with nests, 15; reptiles, 437.

Information based upon mammals obtained by the senior author at Palm Springs in December and January, 1903 and 1904, and February 9 to 13, 1912, is also included in the present report; but inasmuch as the birds observed at these times have already been published upon elsewhere (Grinnell, 1904 a, pp. 40-45; 1912 b, p. 154) they are omitted from this account. They are, however, taken into consideration in the discussion of the

composition and relationships of the fauna of the San Jacinto area. This will explain the mention of species of birds which are not formally listed in the body of the report beyond.

A circumstance which materially aided our work with the vertebrate animals was the previously accomplished *Botanical Survey of San Jacinto Mountain*, carried on and reported upon by Harvey Monroe Hall (1902). Not only was a guide to the flora of the higher parts of the San Jacintos thus made available, but an admirable exposition of the life zones of the area left little need for the expenditure of our own efforts in this direction. In our present contribution it is presumed that the reader will have already familiarized himself with Professor Hall's invaluable paper; we have avoided repetition of everything already set forth satisfactorily in published literature.

DESCRIPTIONS OF LOCALITIES

KENWORTHY AND HEMET VALLEY

Kenworthy is an abandoned mining camp near the upper end of Hemet Valley, at an altitude of 4500 feet. Hemet Valley is broad and nearly level, from one to two miles wide, and extends from Hemet Lake nearly to Vandeventer Flat, a distance of about ten miles. Thomas Mountain hems it in on the southwest, while on the northeast are Hemet Peak and the series of ridges leading down from Tahquitz Peak. The floor of the valley is covered mostly with sage (*Artemisia tridentata*) and widely scattered yellow pines, while at irregular intervals there are grass-covered areas. The largest of these tracts of meadow land is at the head of Hemet Lake and on the adjoining Thomas Ranch; there are other smaller meadows at Kenworthy and Vandeventer Flat. The hills on both sides are covered with Upper Sonoran chaparral: greasewood (*Adenostoma fasciculatum* and *A. sparsifolium*), manzanita, ceanothus and scrub oak. The slopes to the northeast of Kenworthy, culminating in Hemet Peak, are extremely rocky, and the brush is more sparse, with scattering Coulter pines and a few four-leaf piñons. The hills west of the valley are more thickly brush-covered, with many dense clumps of scrub oak at their base. Toward Vandeventer Flat these oak

thickets are more numerous and cover larger areas, in many places extending out upon the floor of the valley. At Vandeventer Flat there are many large-sized live oaks. The scaly-barked, reddish-colored *Adenostoma sparsifolium* is about the most conspicuous feature of the chaparral of this region, while the fact that it was always found in association with the gray vireo (*Vireo vicinior*) brought it forcibly to our notice. The ranges of the two in the San Jacinto Mountains were found to be absolutely the same (see p. 291).

There are settlements in Hemet Valley: at the Thomas Ranch, a large and prosperous ranch just above Hemet Lake; at Kenworthy, where there are several small ranches and the mines above mentioned, the latter abandoned, but mills and other buildings still standing; and at Vandeventer Flat, a single ranch.

We established a base camp at Kenworthy on May 19, making it our headquarters until July 5. Collecting was prosecuted in the vicinity from May 19 to 25 and from June 2 to 11.

DOS PALMOS SPRING

On the desert slope of the Santa Rosa Mountains, at 3500 feet altitude. Two palm trees in a narrow, rocky gulch mark the source of a trickle of water which flows over the rocks for a few hundred yards and sinks in the sand where the cañon opens out upon the more level mesa. This station, below the belt of piñon and sage, is about on the upper margin of the Lower Sonoran zone, with an abundance of typical desert plants and animals. The rolling mesa of hard gravel or sand, with occasional rocky outcroppings, traversed by many sandy washes and gulches, supports a fairly dense growth of brush, creosote, several species of cactus, *pluchea*, *yucca*, and other plants of low zone (see pl. 10, fig. 1). Along the water courses are dense thickets of desert willow (*Chilopsis*), mesquite and catclaw; in several rocky gulches, clumps of two or three palms; and on the stony hills some two miles below the spring the uppermost limit of the ocotilla is reached.

Two miles to the northward Black Hill, a conspicuous landmark, rises abruptly from the mesa, a jumbled pile of loose, black rocks, almost destitute of vegetation. The stream flowing from

Dos Palmos Spring, Carrizo Creek, circles the western base of this mountain, the rocky formation here once more forcing the water to the surface.

About three miles west of the spring lies the tremendous gorge of Deep Cañon, the walls of which drop from the surrounding mesa to a depth of from five hundred to a thousand feet, and so abruptly that from a distance of a few hundred yards on the plain above, there is little or no indication of the break in the topography. Throughout most of the year there is a fairly large stream in the cañon, but no grass or underbrush. A few solitary cottonwoods and ash trees are scattered along the creek.

This region was reached from Kenworthy by means of pack animals. Camps were established here from May 25 to June 2, June 18 to 23, and August 22 to 27. Heavy rains fell in the interval between our second and third visit, swelling the stream in Deep Cañon and bringing up an abundance of bunch grass everywhere on the mesa.

PALM CAÑON

Palm Cañon extends for its entire length, some twelve or thirteen miles, along the eastern base of the San Jacinto Mountains, serving as the dividing line between that range and the Santa Rosa Mountains. The cañon is broad and open, affording little shelter from the hot glare of the desert sun, and the stream of water it contains is unpleasantly warm and brackish.

Between June 11 and 18 three camps were established in this region: at the mouth of the cañon (about 700 feet altitude), near "Little Paradise" (2500 feet), and at about 3000 feet. Our reconnoiters did not include a stretch of about five miles immediately below the head of the cañon at Vandeventer Flat.

The most conspicuous feature of the country at our lowest camp was the forest of Washington palms (see pl. 9, fig. 2), which extends in a narrow line along the stream, from the mouth of the cañon (700 feet) up to about 1000 feet. There was almost a swamp of cat-tails and willows along the stream, while the banks and nearby hillsides were covered with dense thickets of mesquite,

catalaw, screwbean, and arrowweed, with an occasional cottonwood along the creek.

Farther up the cañon, at our higher camps (2500 to 3000 feet), we were above the region of palm trees, and in the agave belt. Great numbers of these plants were in full bloom in June on the sunny sides of the surrounding ridges, especially east of the stream, while the shaded slopes were grown up with a rather scattered growth of yuccas, junipers, and scrub oaks. Along the stream were willow, desert willow (*Chilopsis*), and a few cottonwoods.

At the termination of our stay in Palm Cañon, we traveled directly to Dos Palmos, leaving Palm Cañon at "Little Paradise," ascending a draw to Potrero Spring, skirting Asbestos Mountain on the west and south, and then crossing the northern portion of Piñon Flat. At the summit of the ridges the north sides are scantily clothed with piñon and scrub oak, the south sides and flats down to 2500 feet with juniper, agave, a species of *Prunus*, catalaw, yucca, several species of cactus, and other desert plants.

GARNET QUEEN MINE

On the western slope of Santa Rosa Mountain, at 6000 feet altitude. The mine is abandoned, and the old cabin pertaining to it proved to be a convenient place at which to camp. This was in a steep and rather narrow cañon, at the extreme lower edge of the Transition zone, which is here very sharply defined against the Upper Sonoran just below, the change from greasewood-covered Upper Sonoran hills to pine-timbered Transition being made within a distance of about one hundred feet. North of camp was a chaparral-covered ridge, brushy down to within a hundred yards of the cañon bottom, while the south slope (north facing) was timbered to the top, the usual effects of such slope exposure emphasized by the cutting off of the dry, hot desert air-currents by the first mentioned ridge. Some Transition zone plants at this point were the many incense cedars and silver firs, a few yellow pines and sugar pines, many golden oaks, willows, *Amorpha*, *Ribes*, and *Symphoricarpus*. The region was prolific in bird and mammal life, as well as in insects. In

many instances Upper Sonoran and Transition species of birds could be seen or heard at the same time at the sharply defined boundary between the two zones; but each usually remained well within its own zone. We remained here from June 25 to June 28.

SANTA ROSA PEAK

Our camp at this point, two hours' climb from the Garnet Queen Mine, was in a gulch about half a mile north of the summit of Santa Rosa Peak, and at an altitude of about 7500 feet. We found here a small spring, barely sufficient for our needs, but the only water anywhere about the summit of the mountain. Collecting was carried on all along the ridge between Santa Rosa and Toro peaks. This divide, the highest part of the Santa Rosa Mountains, runs east and west. A slightly higher eminence (Santa Rosa Peak, 8046 feet) is at the west end, and a still higher one (Toro Peak, 8705 feet), is about three miles away at the east end. On the south side of the ridge the slopes are steep, down to the chaparral-covered foothills; on the north side much less so down to the Piñon Flat country. The summit of the ridge and the northern slope down to about 6500 feet, on an average, are well timbered with large trees, the forest being usually open, with very little underbrush. The trees are sugar pine, yellow (or Jeffrey) pine, silver fir and incense cedar. On the summit of Toro Peak, and down two hundred yards from the top, there are stunted limber pines (*Pinus flexilis*), but firs and Jeffrey pines also extend to the summit.

On the whole we considered the entire timbered area of the Santa Rosa Mountains as Transition, with extreme Upper Transition on Toro Peak. The limber pine seen at the latter point was the only higher zone plant observed, and there were none but Transition birds and mammals encountered. A possible exception to this statement was afforded by the observation of two Clarke nutcrackers; but at this season of the year these may well have been wanderers from the nearby San Jacinto Mountains. In fact the species was also encountered in the sagebrush at Kenworthy.

We were on Santa Rosa Mountain from June 28 to July 1.

STRAWBERRY VALLEY

We had two base camps at this point, the first, about half a mile above the "Bungalow" and at the edge of the cluster of buildings forming the Idyllwild summer resort, the second at some abandoned ranch buildings about a mile farther up the valley. The floor of the valley, at about 5500 feet elevation, a broad, gently sloping expanse, is covered with a scattering growth of pines, cedars, and black and golden oaks, lumbering operations of former years having removed a large portion of the forest. The park-like center of the valley is covered almost everywhere with a dense growth of brakes, with occasional meadows interspersed; along the two streams are many alders and some willows, with a dense tangle of gooseberry, rose, and rhododendron bushes beneath; and the more broken ground at the base of the surrounding slopes is covered with large tracts of chaparral, clumps of manzanita and ceanothus, interspersed with open spaces dotted with golden oaks and occasional yellow and sugar pines (see pl. 8, fig. 2).

We were in Strawberry Valley from July 3 to 19.

TAHQUITZ VALLEY

Composed of several rather extensive meadows, at about 8000 feet elevation. In the bottom of the valley are the boggy meadows drained by numerous small streams, grass-covered, with borders of brakes, and in places with large tracts of skunk cabbage (*Veratrum*). Along the streams and in places along the margins of the meadows, are thick clumps of willows and many gooseberry bushes. Above the meadow land, on the drier surrounding slopes, and on the several low ridges intersecting the valley, are extensively timbered areas. The prevailing trees are Jeffrey pine and silver fir, with some lodge-pole pine in places and with much chaparral, mostly chinquapin and buckthorn. On the higher, exposed rocky ridges leading up to Tahquitz Peak the brush is much more dense, and the timber is stunted and scattering, while on the north side of Tahquitz Peak there are a good many limber pines (see pl. 8, fig. 1; pl. 9, fig. 1).

The valley as a whole is high Transition, with a decided tinge of Canadian in the meadows. Birds were abundant here, both as

to individuals and species. In many instances the breeding species were not the same as those encountered in Strawberry Valley, two thousand feet lower. These more boreal forms were Stephens sparrow, Williamson and red-breasted sapsuckers, golden-crowned and ruby-crowned kinglets, and Lincoln sparrow; but besides these there were the hordes of birds of the lower zones beginning the late summer movement into the high mountains. Such species as the Parkman and San Diego wrens, Cassin vireo, and black-throated gray warbler (to mention but a few) were abundant; while occasionally one or two Bell sparrows and black-chinned sparrows, black phoebes, Bullock orioles, and even meadowlarks, were encountered. We were camped in Tahquitz Valley from July 19 to August 5.

HEMET LAKE

At the extreme lower end of Hemet Valley. The lake, lying between lateral ridges, is a mile and a half long and a quarter of a mile across, and was formed artificially by the building of a dam, about two hundred feet high, across the narrow cañon at the outlet of the valley. Lying between Thomas Mountain on the south, and Bald Mountain on the north, it is the natural reservoir and outlet of a vast surrounding area. At the lower (western) extremity of the lake the hills abut closely, the country is rough and brushy, and the shores are steep and rocky; but at the eastern end the valley opens more widely, and in the shallow water of the lake there is a thick growth of tules. Immediately above this end of the lake are stretches of marshy ground, rising gradually to the dry meadow land beyond.

Many large yellow pines surround the lake and dot the meadows above. The adjacent hill sides are densely covered with chaparral, of the same character as that upon the Kenworthy hills; and over the valley southeast of the lake there is a dense growth of sagebrush. On Bald Mountain, to the northward, are many large golden oaks.

The presence of this large body of water in an otherwise rather arid region accounts for the presence here of numerous species of birds and some mammals which do not find congenial surroundings elsewhere in these mountains. We did not visit

the lake at the right time to ascertain what birds were breeding there, but numbers of migrating ducks and waders were seen during our stay. Old nests, possibly of herons, occupied dead trees about the water's edge.

The lake and much of the surrounding country is the property of the Hemet Land Company. The owners allow no camping or shooting on their holdings, thus affording refuge for species of birds which have no other place to turn to in the region, and which were evidently using the lake as a stopping place in their passage over the mountains.

We spent ten days at this point, August 6 to 16.

THOMAS MOUNTAIN

The row of hills bounding the south side of Hemet Valley, from Hemet Lake to Kenworthy, culminates in a high ridge, Thomas Mountain, about three miles south of the lake. The summit, 6823 feet altitude, is reached by a trail leading from the wagon road in Hemet Valley. Dense chaparral clothes the mountain sides nearly to the top, where the country opens out into a series of park-like glades. This stretch, about a mile and a half in length, is grown up with yellow pines and cedars, some Coulter pines at the edge of the brush, and some firs in the gulches at the heads of the cañons, with an occasional clump of large golden oaks. Extensive grassy flats and side hills furnish abundant horse feed. The south-western slope of the ridge is even more brushy than the one we ascended, the chaparral extending quite to the summit of the ridge, and in many places growing to such a height as to cut off all view of Coahuila Valley below.

The drawback to the place is the absence of water, a small spring at the southern end of the plateau, where we camped, and a still smaller one at the northern end, being the whole supply. The gulches seaming the hillsides, all exceedingly steep, are in late summer absolutely dry.

The level summit of the ridge appears to be unalloyed Transition, an area of small size, but sharply defined against the surrounding chaparral, and containing many Transition birds and mammals.

Collecting was carried on at this point from August 16 to 20.

VALLEVISTA

Our camp at this point, the one Lower Sonoran station worked on the Pacific side of the mountains, was at the base of the hills, and at the edge of the wash extending from Bautiste Creek, about a mile southwest of the little settlement of Valle-vista. Here was an extensive area covered with the Lower Sonoran chaparral once so characteristic of the southern California valleys, and now so nearly disappeared through the clearing and cultivation of the land. The gravelly mesa for an area several miles square was grown up with disconnected but luxuriant patches of brush, composed largely of sumac, white sage, wild buckwheat, elder and cactus, with an occasional cottonwood tree, and, toward the hills, a few live oaks. From the edge of this brush land stubble fields extended for miles, to give place in their turn to the extensive orchards about the towns of Hemet and Vallevista.

This proved to be an interesting spot in several respects, for besides being the only Lower Sonoran locality that we visited on the west side of the San Jacinto Mountains, and hence supplying much needed data regarding the distribution of animal life in the region, we found here certain species of mammals, birds, and reptiles characteristic of the same zone on the desert side, but, except in rare and isolated instances, not known to range west of the mountains.

We remained here from August 29 to September 5.

CABEZON

At the northern base of the San Jacinto Mountains lies San Gorgonio Pass, which joins the low coastal valleys with the desert plains to the eastward and separates the San Jacinto and San Bernardino mountain ranges. As it is one of the few low gaps piercing the mountains, it is a great highway for migrating birds passing through the region; and while, from its low elevation, it serves as a point of junction for the widely different Sonoran faunas of the desert and coast regions, it is also an effective barrier between the higher zones of the mountains on either side. These various considerations made it desirable that careful ob-

servations be made and specimens acquired from the base of the mountains bordering the pass, and four camps were therefore established in this region, at Cabezon, Snow Creek, Whitewater and Banning. These were all on the desert slope. The San Diegan fauna and flora extend over the summit of the divide well down towards the desert, and it was the region of blending with the desert fauna that we wished especially to explore.

The first camp was at Cabezon. The railroad station of this name, about twelve miles from Beaumont at the divide, lies about midway between the summit of the pass and the floor of the desert. Camp was established in the foothills, a mile and a half south of the railroad, at an elevation of about 1700 feet. The precipitous slopes at this end of the mountains are clothed to their bases with the dense Upper Sonoran chaparral characteristic of the Pacific side of the range, while the cañons are steep and narrow, containing comparatively few trees. This association carries with it many of the birds and mammals of the Pacific slope, these in most cases extending quite to the base of the hills, but not out upon the floor of the valley below. This latter area, also densely covered with brush and cactus, but of Lower Sonoran forms, is inhabited by a few desert species of animals though many of the most typical do not ascend this high in the pass. The vegetation here is of the character of the Lower Sonoran washes of the San Diegan district rather than that of the Colorado Desert, but some desert plants, such as the mesquite, were also found in small quantity.

Field work was prosecuted at Cabezon from May 1 to 25.

SNOW CREEK

Snow Creek is an extremely precipitous cañon extending due north from the rocky summit of San Jacinto Peak and emptying onto the floor of the desert near Whitewater, about seven miles east of Cabezon. Camp was established at the mouth of the cañon, at about 1500 feet elevation. San Jacinto Peak, towering above, at an altitude of 10,805 feet, was in an air line less than five miles distant, the mountain sides here being little less than a series of precipices. A narrow line of trees bordered the creek, mostly alder, with an occasional cottonwood. Away

from the creek the cañon was sparsely brush-covered and strewn with boulders and huge rock piles, being little more than a storm cone up to about 2000 feet, above which altitude it abruptly narrowed.

The vegetation at this station was more typically that of the desert than it was at Cabezon. Such desert plants as creasote, mesquite and catclaw grew in some profusion, while at the mouth of a cañon just south of Snow Creek there was a small bunch of palm trees. The latter afforded our westernmost record station for this plant. Typically desert birds and mammals were also more numerous than they had been found to be a few miles farther up the pass. In Snow Creek Cañon above the desert floor Upper Sonoran species extended downwards to the limit of chaparral, as at other points along this slope of the mountains.

Camp was maintained at the mouth of Snow Creek from May 25 to June 3.

WHITEWATER

From June 3 to 6 collecting was prosecuted at Whitewater, a station on the railroad about two and a half miles northeast of the mouth of Snow Creek, and at an altitude of 1130 feet. This point is the westernmost extension of the rolling sand-dune-covered country characteristic of the adjacent portion of the Colorado Desert, and here were found such exclusively desert species as *Dipodomys d. deserti*, *Dipodomys m. simiolus* and *Citellus t. chlorus*.

San Gorgonio Pass is noted as a region of heavy winds, and Whitewater is exposed to the full force of the gale from the west, more, perhaps, than any other portion of the pass.

BANNING

Camp was pitched in the San Jacinto foothills about two miles southeast of the town of Banning and at an elevation of 2300 feet. The lower parts of the mountains at this point were covered with a dense growth of typical Upper Sonoran chaparral, mostly greasewood, with a good deal of white sage, some poison oak and elder, and a few scattering live oaks. The brush in

the valley below was largely composed of catelaw. Banning lies at the eastern end of the great grain and fruit growing region which occupies all of the center of San Gorgonio Pass to the westward. At this point the orchards and grain fields of established cultivation cease, and east of here the desert conditions prevail, unbroken except for sporadic attempts at farming and for occasional limited oases at the mouths of cañons.

But very few desert animals were found this far to the westward and in complementary fashion such typical San Diegan species as valley quail, Pasadena thrasher, western lark sparrow and wren-tit among birds, and *Reithrodontomys m. longicauda*, *Perodipus a. agilis*, and *Citellus b. fisheri* among mammals, occurred in great abundance. Of several widespread species of mammals having different subspecies on the coast and desert sides of the range, such as *Neotoma intermedia*, *Perognathus panamintinus* and *Perognathus fallax*, Banning specimens proved to be intermediate in characters, indicating that this was approximately on the line of mergence of the desert and coast faunas.

Collecting was carried on at Banning from June 6 to 16.

SCHAIN'S RANCH

The trip from Banning to Schain's Ranch, about eleven miles, was made over a wagon road. Banning, at an elevation of 2200 feet, lies at the lower edge of the Upper Sonoran life zone, and Schain's Ranch, 5000 feet, at its extreme upper limit. The road between the two points winds through chaparral-covered hills for most of the distance, except at Poppet Flat, 4000 feet, where a ranch is located. Here there is a great deal of open ground, extensive fields and meadows, dotted with large live oaks. Above this point buckthorn and manzanita begin to replace the grease-wood thickets of the lower hills.

Camp was established at the ranger's cabin, about a quarter of a mile distant from Schain's Ranch. This was situated on the summit of the broad ridge marking the divide between the San Gorgonio Pass and San Jacinto Valley drainages of the mountains. In every direction below camp extended Upper Sonoran chaparral; a short distance above there was a clump of yellow pines, and farther up, Transition pine forests covered

the hillsides. Immediately about the cabin there were small areas of grass and flower-covered meadows. The majority of the birds and mammals collected here were of Upper Sonoran species, the Transition species, though but a short distance away, seldom straying down this far.

This camp was occupied from June 16 to 30.

FULLER'S MILL

This station, about midway between Schain's Ranch and Strawberry Valley, was at the same elevation as the latter point, 6000 feet, and well within the Transition Zone. Fuller's Mill, on the western slope of the range, lies in a huge amphitheater, surrounded by high ridges except on the southwest. The streams all drain into the north fork of the San Jacinto River.

The region is, in its general characteristics, much like Strawberry Valley, being fairly level and grown up with open woods, with little underbrush. The forest trees are largely yellow pine, white fir, incense cedar, Coulter pine, and black and golden oaks.

It was at this point that the party ascending this section of the mountains first encountered such Transition species as the white-headed woodpecker, mountain chickadee, slender-billed nuthatch, Audubon warbler, and others found commonly from this altitude upward. Camp was maintained here from June 30 to July 5.

ROUND VALLEY

This little valley, the highest point at which a camp was established, 9000 feet, lies at the east base of San Jacinto Peak, the streams draining eastward down the exceedingly steep slopes above Palm Springs. It is timbered chiefly with lodgepole pine, though there is a good deal of fir and Jeffrey pine on the dry, rocky ridges to the northward, while the higher surrounding slopes are clothed with chinquapin, manzanita, and buckthorn. The center of the valley is occupied by a small cienaga, a few acres of grassy marsh bordered by veratrum patches and willow thickets.

To the northwest rises San Jacinto Peak, 10,805 feet, the highest point in the range. Ascending the mountain, limber pine extends, though in dwarfed or prostrate form, clear to the summit, where we saw also a very little chinquapin, *Ribes*, and a few tufts of *Juncus* and grass growing in the crevices between the granite slabs. Otherwise the summit is a mass of huge, loosely piled boulders, with occasional patches of bare gravel. For a careful analysis of the flora of San Jacinto Peak see Hall (1902).

The abruptness of the eastern slope of the peak renders ascent from that side so difficult that we did not attempt to work the middle altitudes. The tremendous declivities to the desert below are so nearly vertical that, from the summit, we beheld the various desert stations previously explored spread out below us as on a gigantic relief map.

A consideration of the animal life did not enable us to distinguish the presence of any zone above Canadian. The area of sufficiently high altitude for more Boreal forms was probably too small to support any birds or mammals limited to these high altitudes.

In Round Valley gray squirrels and ground squirrels occur, as well as *Eutamias speciosus*, *E. merriami*, *Peromyscus maniculatus sonoriensis* and *P. boyleyi rowleyi*. Deer were seen on San Jacinto Peak up to nearly 10,000 feet, at the upper limit of *Ceanothus cordulatus*. Birds seen on the summit of the peak between 1:30 and 3:30 P.M., July 27, were: many Sierra juncos, and a lesser number of mountain chickadees, violet-green swallows, and white-throated swifts, one family of pigmy nuthatches, one rufous hummingbird, two San Diego wrens, one western house wren, and an unidentified hawk which appeared momentarily through a rift in the dense cloud bank overhead.

The members of the expedition who had ascended the mountains from San Geronimo Pass, had a camp in Round Valley from July 6 to 12. The two authors of the paper made a visit to Round Valley and the summit of San Jacinto Peak on July 27, from their camp in Tahquitz Valley, and the junior author repeated this trip August 1 and 2.

LIFE AREAS OF THE REGION

The distribution of each one of the species of vertebrate animals inhabiting the San Jacinto area appears to respond to the influence of at least three entirely different orders of ecological delimitation. These three kinds of control are indicated by the adjectives: zonal, faunal, and associational. The conceptions involved in each are probably not subject to precise definition; at any rate we do not find it feasible even to attempt such treatment with the limited data thus far accumulated. In each case the general notion may be conveyed by the citation of instances, and by mere suggestions as to causative factors.

LIFE ZONES

The concept of life zones has been the most commonly recognized of the three. The various factors involved have been exhaustively discussed by C. H. Merriam, in his various papers, notably the one giving the results of his studies on Mount Shasta (see Merriam, 1899). Further discussion, particularly germane in the present connection, is contributed in Hall's (1902) *Botanical Survey of San Jacinto Mountain*.

In a broad way the extent of life zones is dependent upon temperature, more particularly of the summer season. San Jacinto Peak rises to a height of 10,800 feet, from a base level on the west side of 1500 feet, and on the east side of less than 500 feet. This great increase in altitude brings commensurate but converse modification in temperature, varied locally, however, by a score of subsidiary factors.

The remarkable abruptness of the declivity on the northeast side of San Jacinto peak results in the crowding of all the zones from Lower Sonoran to Boreal into the extraordinarily narrow air-line distance of three miles. The zones represented on the immediate slopes of the mountain are thus (1) Lower Sonoran, (2) Upper Sonoran, (3) Transition, and (4) Boreal (see plates 6 and 7).

While we thus employ four zone names, Hall (1902) recognized five. Hall did not deal specifically with the Lower Sonoran zone, and hence omitted it in his enumeration. On the other

hand we have found ourselves unable to establish from our study of the vertebrate animals the presence of more than the lower division of the Boreal, namely, Canadian. Hall, from his study of the plants, recognizes all three divisions of the Boreal zone, namely, Canadian, Hudsonian, and Alpine-Arctic. His argument for the recognition of the last is based, it seems to us rather insufficiently, upon the presence of three species of plants peculiar to this zone. Since no exclusively Hudsonian species are listed by him, his recognition of the Hudsonian zone must rest on the presumption that if there is Alpine-Arctic, the interlying zone between it and Canadian must be present also.

In our examination of the vertebrate portion of the biota of the same localities studied by Hall, we have failed to discover any representative of exclusively higher zonal position than Canadian. Our use of the inclusive term Boreal in dealing with the animals appears to us both safer and more convenient than to use one or more separate designations for the divisions faintly indicated in the flora alone.

As a further consideration, there would appear to be small reason for the presence of anything above the Hudsonian at farthest. The relatively small area of sufficiently high altitude to bring even Hudsonian conditions might in itself be the cause of the absence of the requisite low temperature for the two higher zones, save in extremely limited spaces in the north-facing gulch at the head of Snow Creek, where snow banks linger nearly through summer. It was here that Hall found the three Alpine-Arctic plants.

A law is probably indicated in this and similar cases, that the sharper an isolated peak, that is, the more abrupt the flanking slopes, the higher extend the low zones; or, expressing the idea reversely, the larger the land mass of high altitude the lower extend the high zones. In the vicinity of Mount Whitney, 200 miles to the north of San Jacinto, the Canadian zone runs up to an average of 9000 feet, the Hudsonian to 11,200 feet. The highest point on San Jacinto is 10,800.

Thus altitude, latitude, and the above law all argue against the existence of zonal conditions on San Jacinto much higher than Canadian. The animal life certainly indicates this as far

as the vertebrates are concerned. Furthermore, the presence of a very small proportion of the elements of a higher zone may be better considered as a dilution of a lower zone rather than as justifying the formal recognition of the high zone.

We have found ourselves independently led to recognize an upper and a lower division of the Transition zone, this being in accord with Hall's proposal based upon the plants of the region. The modifying terms "upper" and "lower" will thus be frequently employed in the discussion of species. Transition, in its entirety, remains the same as in ordinary use.

In comparing our zone map with that of Hall's (1902, plate 2), minor differences will be observed. The chief one is in the vicinity of Hemet Valley, where scattering yellow pines occur over the more nearly level tracts. We have decided this tree, unquestionably Transition in usual zone position, to be best treated as denoting a Transition infiltration into a prevailingly Upper Sonoran area. This is because we found nothing but Upper Sonoran birds and mammals in the debatable area. The location of certain tracts in Hemet Valley where pines grow most numerous is indicated on our map by blue spots, as the only practicable way of showing this Transition admixture, without undue emphasis. We feel secure in our grounds for showing Thomas Mountain to be capped, merely, by Transition, wholly disconnected from the main Transition area on San Jacinto proper. The slopes of this mountain on all sides are certainly Upper Sonoran and not Transition as indicated on Hall's map. Remarks upon the zonal position of various other localities with reasons for our diagnoses will be found in our "Descriptions of Localities."

FAUNAS

In the restricted sense in which we believe the term best employed, a fauna is a subdivision of a life zone, based upon conditions of atmospheric humidity. Thus in travelling eastward across North America from the shore of the Pacific, at San Francisco, keeping within the same zone, say Transition, one passes through a series of belts possessing different assemblages of plants and animals. These divisions are no more sharply

defined than are zones, but their existence is readily appreciable when one considers large areas, and the recognition of them in dealing with problems of distribution is expedient as a measure leading to relative accuracy of treatment.

In the San Jacinto region two areas of very different faunal complexion meet. But only the Lower and Upper Sonoran zones are involved in this junction. Thus, to be absolutely correct, *four* faunas should be distinguished by name, one for each faunal division of each zone. We have, however, found it more convenient to combine the two Sonoran sections on the arid side under one name, Colorado Desert fauna, calling the two on the Pacific side together the San Diegan fauna or district. The inter-relations of these two faunas are discussed at length in another chapter (see pp. 388-392).

While the positions of life zones are determined chiefly by latitude and altitude, faunas are delimited by factors dependent upon proximity of oceans, and air currents in connection with topographic features. Faunas in North America tend towards a longitudinal, or north and south position, and hence transect life zones, cutting them up into lesser life areas.

ASSOCIATIONS

The term "association" as applied to animals is allied in meaning to the "formation" of some botanists. Each association is inclusive of one or more of the botanist's "formations"; but it also includes the animal life present, even when, as happens with carnivorous forms, there may be no direct dependence upon plants.

The names employed in designating associations are taken from conspicuous or dominant permanent elements. Thus convenience is the sole criterion in selecting names. As with zones and faunas, associations are often capable of subdivision; in fact such splitting may be carried logically to the point where but one species occupies each its own niche. However, at the present stage of study, the larger groupings, or major associations, are most serviceable, with, in a few cases, recourse to smaller or minor associations.

The way in which the associational conception is made use of, will be more clearly perceived by reference to the distributional treatment of individual species. Let it suffice here to list some of the conspicuous associations, and then cite some instances in illustration of how these terms are used.

ASSOCIATIONS IN THE SAN JACINTO AREA

OF MAJOR RANK	OF MINOR RANK
Chaparral	Adenostoma Sage-brush Scrub-oak Chinquapin
Forest	Live-oak Yellow Pine Silver Fir
Riparian	Willow Chilopsis Mesquite
Rupestine	
Meadow	
Sand-flat	Aeolian Wash

It is thus patent that a given major association may be present in several zones and faunas, but its minor divisions are much more restricted.

In definitely diagnosing the faunistic position of a species it may become necessary to use all three of these distributional conceptions. As examples: (1) *Sylvilagus b. cinerascens* and *Virco vicinior* in the San Jacinto area are members of the Adenostoma minor association, of the Chaparral major association, of the San Diegan Faunal district of the Upper Sonoran Zone; (2) *Passerella i. stephensi* belongs to the Chinquapin minor association, of the Chaparral major association, of the San Bernardino Faunal division of the Transition zone; (3) *Perognathus spinatus* and *Peromyscus c. stephensi* belong to the Rupestine association of the Colorado Desert fauna of the Lower Sonoran zone.

Just as with life zones and faunal areas, we find many species, of wide dispersal through two or more of even the major associations. For such cases various modifying terms become necessary.

In thus attempting to bring some degree of order into the distributional treatment of the species of a large area, we would urge a reasonable limitation. For efforts of this sort serve to impress upon the student the fact that there is the reverse of uniformity in the behavior of species. In fact if we should carry our analytical processes far enough, we should doubtless find that no two species anywhere exist under precisely the same set of conditions; hence the dependent conclusion that no two species occupy precisely the same area.

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GENERAL ACCOUNTS OF THE BIRDS

Colymbus nigricollis californicus (Heermann)

Eared Grebe

One seen at Hemet Lake, August 8; apparently still in the breeding plumage.

Podilymbus podiceps (Linnaeus)

Pied-billed Grebe

Seen only at Hemet Lake, where several were observed on August 10.

Phalacrocorax auritus albociliatus Ridgway

Farallon Cormorant

At Cabezon, May 11, a flock of about fifty was seen flying westward through San Geronio Pass. At Banning, June 8, one was taken on a reservoir near the town, a male in the brown, presumably immature, plumage (no. 2054). Observed elsewhere only at Hemet Lake, where a single bird was seen August 9.

Anas platyrhynchos Linnaeus

Mallard

Seen only at Hemet Lake, where on August 10 a flock of five, and on August 21 several flocks of ten or twelve, were noted.

Dafila acuta (Linnaeus)

Pintail

Migrating pintails appeared at Hemet Lake in August, a flock of six being noted on the 8th, and several larger flocks on the 21st.

Querquedula cyanoptera (Vieillot)

Cinnamon Teal

Observed at Hemet Lake in August, flocks being noted on the 8th, 10th, and 21st.

***Marila affinis* (Eyton)**

Lesser Scaup Duck

A male scaup duck, presumably this species rather than the rarer *M. marila*, was seen at Hemet Lake, August 10.

***Erismatura jamaicensis* (Gmelin)**

Ruddy Duck

Probably about fifteen individuals remained at the upper end of Hemet Lake during the first three weeks in August. They were seen almost daily, a large proportion of them being still in the bright breeding plumage, and were far too wary to permit a near approach.

***Dendrocygna bicolor* (Vieillot)**

Fulvous Tree-duck

One reported by Richardson as killed by a hunter near Cabezon, May 20. It was flushed from the grassy bank of an irrigating ditch, and was undoubtedly a migrant.

***Plegadis guarauna* (Linnaeus)**

White-faced Glossy Ibis

One killed by a hunter at Banning, June 7, was examined by Richardson. The owner would not part with the specimen, and the species was not otherwise encountered by the expedition.

***Botaurus lentiginosus* (Montagu)**

American Bittern

One reported by Richardson as seen in a flooded alfalfa field near Cabezon, May 15; probably a transient.

***Ardea herodias hyperonca* Oberholser**

California Great Blue Heron

Observed only at Hemet Lake, two seen on August 8 and one on August 10.

Nycticorax nycticorax naevius (Boddaert)

Black-crowned Night Heron

Migrating night herons were observed on numerous occasions on the east slope of San Geronio Pass, single birds being noted at Snow Creek, Whitewater, and Cabezon, on dates ranging from May 24 to June 3. Several seen at Hemet Lake early in August were also probably transients.

Butorides virescens anthonyi (Mearns)

Anthony Green Heron

Single birds, probably migrants, seen at Cabezon and Whitewater, on May 16 and 30, respectively. Next observed, a solitary individual, at Hemet Lake, August 15.

Fulica americana Gmelin

Coot

Seen only at Hemet Lake, where, during the first two weeks in August, the species was fairly common at the marshy upper end of the lake.

Steganopus tricolor Vieillot

Wilson Phalarope

Three seen together at the east end of Hemet Lake, August 11. One of these secured (no. 2946) is a female in juvenal plumage, with traces of first winter plumage appearing on the back. On August 22 a large flock of phalaropes was observed far out on the lake. From a distance they appeared to be too small for this species, and may have been *Lobipes lobatus*, but they could not be approached near enough for positive identification.

Recurvirostra americana Gmelin

Avocet

Encountered only at Hemet Lake. On August 8 a flock of ten, and on August 21 several single birds were seen along the shore at the upper end of the lake. The one specimen taken, an adult female secured on August 8 (no. 2942), is molting into winter garb, the plumage of the head, neck and upper breast being a mixture of gray and cinnamon colored feathers.

Himantopus mexicanus (Müller)

Black-necked Stilt

Seen on Hemet Lake in August, a flock of five on the 6th and several single birds on the 21st. Probably only a migrant through the region.

Gallinago delicata (Ord)

Wilson Snipe

On August 14 one bird, probably a migrant, was flushed from some marshy ground at the east end of Hemet Lake.

Pisobia minutilla (Vieillot)

Least Sandpiper

Fairly common in small flocks on the mud flats at the eastern end of Hemet Lake, August 6 to 16. One specimen was preserved (no. 2949), an immature male in first winter plumage.

Helodromas solitarius cinnamomeus (Brewster)

Western Solitary Sandpiper

Migrating individuals were seen along the shores of Hemet Lake on several occasions from August 6 to 16. Two specimens were secured (nos. 2947, 2948), on August 10 and August 15, respectively, both immature males.

Actitis macularius (Linnaeus)

Spotted Sandpiper

Apparently a migrant only. In the vicinity of Cabezon the species was noted on several occasions from May 12 to 20. Here they were seen along the little streams near the mouths of the cañons, usually single birds, though once as many as four were seen together. At Hemet Lake, August 6 to 16, scattered individuals were observed along the shores of the lake upon several occasions, and doubtless a little search would have revealed their presence at any time during this period. Two specimens were taken (nos. 1746 and 2067), both males in breeding plumage, the first secured at Cabezon, May 17, the second at Snow Creek, May 29.

***Oxyechus vociferus* (Linnaeus)**

Killdeer

Seen on various occasions in the moister portions of Hemet Valley, between Hemet Lake and Kenworthy. They were not numerous, but some were ordinarily noted whenever we traversed these spots, as happened on several occasions between May 19 and July 5, and they were probably breeding here. At Hemet Lake in August they were abundant, frequenting the sparsely covered meadows on the north side and the mud flats at the east end. Three specimens were taken at the lake (nos. 2943-2945), August 7 and 15, probably birds of the year.

***Oreortyx picta plumifera* (Gould)**

Mountain Quail

Of general distribution in the higher parts of the mountains, though seldom observed in any numbers. Near Kenworthy toward the end of May, small flocks of old and young together were frequently seen in the surrounding foothills, but never in the sage-covered valley. Near the summit of Santa Rosa Peak, the end of June, several small flocks composed entirely of adults, were seen. Not encountered in Strawberry Valley, though the species must occur there, but fairly numerous in the nearby Tahquitz Valley at the end of July. At Hemet Lake, in August, they were frequently seen in the rougher, more broken ground toward the lower end of the lake, but never in the open valley at the upper end, where *Lophortyx c. vallicola* was common. On Thomas Mountain, the middle of August, mountain quail were abundant, large flocks of nearly full-grown young being flushed at many points along the ridge.

The party collecting on the northern slopes of the San Jacinto Mountains did not meet with the species until the vicinity of Schain's Ranch was reached. At this point and at Fuller's Mill, the latter part of June, flocks of old and young together were seen occasionally, and specimens collected.

Near the east base of the mountains, at points in the lower reaches of Palm Cañon, and in the vicinity of Deep Cañon, mountain quail were several times observed amid the most arid.

desert surroundings. On May 27 a flock of six adults was encountered at a spring on the brink of Deep Cañon, where a flock of *Lophortyx gambeli* had been flushed earlier in the day; and on May 29 a single mountain quail was again seen at the same place. On May 26 a flock of adults, and on May 31 a brood of young, was observed along Carrizo Creek, near Dos Palmos Spring. The mountain quail seen at these neighboring points were probably all wanderers from the nearby Upper Sonoran piñon belt, attracted by the occasional springs along the lower cañons and washes.

On June 12 and 13 small flocks of adults were noted in different gulches in the vicinity of Potrero Spring, cañons tributary to Palm Cañon, from the east. This again is a region where *Lophortyx gambeli* is abundant.

The flocks of half-grown young seen in Tahquitz Valley, and the older immatures observed later, on Thomas Mountain, when startled, frequently behaved in a manner quite different from the usual habit of the adult mountain quail, and much like that of the forest-inhabiting species of grouse. Instead of running they took to the trees, where they sat motionless, and were very hard to see or to dislodge.

In all, nineteen specimens were secured: Schain's Ranch, four (nos. 1780-1783); Fuller's Mill, two (nos. 1867, 1868); Tahquitz Valley, three (nos. 2869-2871); Hemet Lake, one (no. 2956); Thomas Mountain, seven (nos. 3008-3014); Kenworthy, one (no. 2250); and Santa Rosa Peak, one (no. 2469).

According to the A. O. U. *Check-List* (1910, p. 135) the habitat of *O. p. confinis*, described originally from the San Pedro Martir Mountains, Lower California, extends north to include the mountains of southern California, even to the San Gabriel Mountains. It will have been noted from the heading of this account that we are not in accord with the idea reflected in the statement just referred to. Although we have no material from the San Pedro Martir region, we are fortunate in being able to compare adequate series from southern and east-central California.

The two characters offered by the describer of *confinis* (Anthony, 1889, p. 74) are, as compared with *plumifera*, relatively

“grayer upper parts and thicker bill.” We have tested the material at hand as regards these two characters and are absolutely unable to distinguish our birds from the San Jacinto Mountains and elsewhere in southern California, from perfectly comparable material as regards age and stage of plumage from various parts of the Sierra Nevada, central as well as southern. The Museum’s series includes good specimens from extreme southern San Diego County: Campo, Mountain Spring, Cuyamaca and Volcan mountains. These, also, are in no appreciable way different from *plumifera*.

In other words, we see no excuse for using any name other than *plumifera* for the mountain quail of southern California.

***Lophortyx californica vallicola* (Ridgway)**

Valley Quail

An abundant species in the San Jacinto Mountains, found at all suitable points from the Lower Sonoran valleys surrounding the range, up into the lower edge of Transition. Twenty-two specimens were collected, as follows: Snow Creek, three (nos. 2160–2162); Cabezon, five (nos. 1657–1661); Banning, four (nos. 2018–2021); Vallevista, three (nos. 3094–3096); Dos Palmos, two (nos. 2491, 2492); and Palm Cañon, five (nos. 3046–3050). Other points of record are Vandeventer Flat, Kenworthy, Hemet Lake, Thomas Mountain, Strawberry Valley, and Schain’s Ranch. Most of these localities are in Upper Sonoran, the highest points only—Strawberry Valley (6000 feet) and Thomas Mountain (6800 feet)—being at the lower edge of Transition.

This quail breeds in greatest abundance on the sage-brush covered floor of the upper Hemet Valley, the region from Hemet Lake to Vandeventer Flat being peculiarly adapted to the species. At Kenworthy, in this valley, they were numerous, and nearly all in pairs at the time of our arrival, May 19. A nest was found here on May 23 (no. 72), very imperfectly concealed at the base of a scanty clump of sage brush. The slight depression in the ground forming the nest was scantily lined with grass and weed stalks; at this date it contained ten fresh eggs. A second nest, containing eight eggs, was found on June 23 in the same locality,

and in a similar situation. At Cabezon, May 7, and at Banning, June 8, two others were discovered, each of these also containing eight eggs.

Broods of young were noted, first at Banning, June 8, then at Dos Palmos, June 21, and, after July 1, whenever the species was encountered. Specimens taken at Banning early in June are in juvenal plumage; some from Vallevista, the first week in September, are in complete first winter plumage, but many half-grown juvenals were seen at the same time.

On Piñon Flat, at Dos Palmos, and at points in Palm Cañon, the valley quail and desert quail (*L. gambeli*), were found at the same places, frequently in the same flocks. In Palm Cañon at about 3000 feet, on June 12, and about the nearby Potrero Spring, 3500 feet, on the following day, the two species were seen flocking together. At Dos Palmos, in June and August, the same condition of affairs was noted. A frequent manner of occurrence here was for a female with her brood to be accompanied by five or six adults of either species. In the desert regions quail were usually observed along those ravines which contained occasional slight seepages of water.

The stations at Idyllwild and on the summit of Thomas Mountain may be taken as marking the highest range of the species in the San Jacintos. At the former point three were seen on June 8, at the latter a small flock August 17, each time in the near neighborhood of areas of chaparral extending upward between tracts of conifers, thus invading Transition.

***Lophortyx gambeli* Gambel**

Desert Quail

A common species at the desert base of the mountains, ranging upward on the eastern slopes to the edge of Upper Sonoran. Our parties met with it at Piñon Flat, Dos Palmos, and Palm Cañon; none was seen at Whitewater, Snow Creek, Cabezon or Banning, though the species has been recorded from all these points (Gilman, 1907, p. 148). At Cabezon, however, a member of the expedition was told that the species was sometimes seen there in winter.

We preserved six specimens, as follows: Piñon Flat, one (no. 2486); Dos Palmos, four (nos. 2487-2490); and Palm Cañon, one (no. 3051).

Asbestos Spring, at the edge of Piñon Flat (altitude 4500 feet) and a point in Palm Cañon about eight or ten miles from its mouth (altitude 3000 feet), were the upper limits at which we found this quail. On Piñon Flat desert quail were seen on various occasions in May, June and August, in Palm Cañon (3000 feet), and Potrero Spring (3500 feet), June 12 to 14, at the mouth of Palm Cañon, and in the nearby Murray Cañon, June 14 to 17, and at Dos Palmos, in May, June and August.

A brood of small young was seen on Piñon Flat, June 2; toward the end of June, in the vicinity of Dos Palmos, several small flocks of old and young together were seen. A young male taken at the latter point on August 24 (no. 2489), is in the midst of the molt from juvenal to first winter plumage.

An adult male taken on Piñon Flat, June 2 (no. 2486), had its stomach and crop filled with ants and mistletoe berries from the surrounding junipers.

As mentioned under the previous species, there were points in Palm Cañon and the vicinity of Dos Palmos, where *L. gambeli* and *L. c. vallicola* were seen together. In fact, on two occasions, at the edge of Deep Cañon, May 27, and near Potrero Spring, June 13, these two species, together with *Oreortyx p. plumifera*, were all flushed from the vicinity of the same spring. In the overlapping of the ranges of the valley and desert quails, however, both here and at other points, it will be noted that it is the coast form (*L. c. vallicola*) which has invaded the typically desert environment of the other form (*L. gambeli*). Although the valley quail ranges continuously throughout the length of Palm Cañon, and over Piñon Flat, into Hemet Valley and on down to San Jacinto Valley, *gambeli* is stopped at the very edge of the Upper Sonoran zone, where the desert vegetation gives way to the coast chaparral, and it has not yet been found on the west side of the mountains.

***Columba fasciata fasciata* Say**

Band-tailed Pigeon

Evidently now a rare species in the region traversed, at least during the summer months. Pigeons were seen in numbers, only in the vicinity of Schain's Ranch and Fuller's Mill, these being closely adjacent localities. Here, on various occasions from June 22 to July 4, single birds, or sometimes a pair together, were occasionally seen flying overhead, or flushed from the trees.

At Fuller's Mill (5900 feet) on July 1, a nest was found containing one egg (no. 67). The frail structure was placed on a large limb of an oak tree, about five feet from the trunk, and partly supported on one side by a small dead limb. The nest is a mere slight platform of sticks, mostly small dead twigs from pine and oak trees. The diameter of the mass is about 220 mm., though several straggling twigs extend far beyond this, the depth being 100 mm. The egg was slightly incubated. The female bird was flushed from the nest, and secured (no. 1866): another, possibly its mate, was seen nearby. Dissection of the female showed no additional egg in process of development.

The only subsequent occasion on which the species was encountered was on the summit of Thomas Mountain, on August 17, where a single bird was observed flying past. Pigeons were reported to have been numerous on an oak-covered mountain north of Hemet Lake. It is likely that at times they visit the mountains in numbers, possibly as migrants or winter visitants.

***Zenaidura macroura carolinensis* (Linnaeus)**

Mourning Dove

Found in small numbers at most of the points visited in the mountains below Transition; at the desert base they occurred in great abundance. The highest points of record were Strawberry Valley (6000 feet), and Thomas Mountain (6800 feet), both just at the lower edge of Transition; at neither point were they at all numerous.

In the vicinity of Dos Palmos, in May, June, and August, and along Palm Cañon, clear to its mouth, in June, doves were of general distribution, though nowhere abundant. Along the

northern base of the mountains, at Whitewater, Snow Creek, Cabezon and Banning, this was one of the most common birds.

Nests containing eggs or young were found at Dos Palmos, Cabezon, and Snow Creek in May, and at Vallevista at the end of August. One discovered on the steep side of Deep Cañon, May 30, was on the ground under the shelter of an overhanging agave. The nest was a collection of fine twigs, built up at the lower side so as to form a shelf on the steep slope, and contained two incubated eggs. Others were found, as follows: two at Cabezon, May 5, built in low bushes three or four feet from the ground, each with two eggs; two at Snow Creek, one, May 27, in a sycamore, seven feet up, the other May 29, on the ground, under a bush, each with eggs; and two at Vallevista, August 30, both in low bushes in the chaparral, and each containing small young.

At Dos Palmos, though only a few individuals were breeding in the vicinity, the scattered springs and seepages attracted many more, some probably from a long distance. One shot May 29 contained undigested barley in its crop, which must have been eaten many miles away.

Seven specimens were preserved: Cabezon, three (nos. 1606-1608); Snow Creek, three (nos. 2163-2165); and Dos Palmos, one (no. 2493).

***Cathartes aura septentrionalis* Wied**

Turkey Vulture

Not a common species in the mountains. A few were seen at different times in Hemet Valley, at Kenworthy in May, and at Hemet Lake in August. At the northern base of the mountains, the eastern slope of San Gorgonio Pass, they were rather more numerous, as at Whitewater, Snow Creek, Cabezon and Banning. A few were observed at Dos Palmos in May and June. In the San Jacinto Valley, about Vallevista and Hemet, large flocks were noted in August and September.

The two examples preserved (nos. 2345, 2346) were both caught in steel traps set for carnivores, and baited with meat, the bodies of skinned birds and mammals. The first (no.

2345, ♀), killed at Kenworthy, May 22, got into a trap set in the chaparral, and with the bait entirely concealed from above by the overhanging bushes, so that the bird apparently must have discovered it by the sense of smell alone. The second one (no. 3138, ♂), taken at Vallevista, was caught in the open wash, where the bait was in plain sight.

[**Gymnogyps californianus** (Shaw)]

California Condor

Was not encountered by any member of the expedition. Formerly abundant, their numbers were greatly reduced through their eating of poisoned meat placed out for bears and other carnivores, and they are now either wholly extinct or extremely rare in these mountains. We were told that a pair formerly nested in the cliffs above Snow Creek, on the north side of San Jacinto Peak.]

Accipiter velox (Wilson)

Sharp-shinned Hawk

The capture of a single bird at Round Valley, July 7, suggests the possibility of the species occasionally breeding in this region. Another was seen on Tahquitz Peak, July 22. These are the only records for the season. The one secured (no. 2074) is an immature male, just beginning to molt into the adult plumage, numerous blue feathers showing among the wing coverts and secondaries.

Accipiter cooperi (Bonaparte)

Cooper Hawk

Common, for a hawk; generally distributed over the mountains and observed at most of the points visited. We have notebook entries relative to its occurrence at Dos Palmos, Toro Peak, Garnet Queen Mine, Kenworthy, Thomas Mountain, Hemet Lake, Strawberry Valley, Tahquitz Valley, Round Valley, Schain's Ranch and Cabezón. Specimens were collected as follows: Garnet Queen Mine, an adult female and three juvenals (nos. 2387-2390), Strawberry Valley, an adult female (no. 2656), and Vallevista, an immature male (no. 3457).

Two nests were found, one at the Garnet Queen Mine, June 27, containing three young in natal down, the other in Strawberry Valley, July 9, also with young. The first, placed in a golden oak, thirty feet up, was a rather bulky structure, built of sticks and crooked twigs, and lined with cedar bark. The female parent had been shot two days previous to the discovery of the nest, but the male bird had evidently since kept the young supplied with food, for in the nest were two headless and carefully plucked flickers, and fragments of another flicker, a California jay and a Merriam chipmunk.

The Strawberry Valley nest, also in a golden oak, was similar to the first one.

***Buteo borealis calurus* Cassin**

Western Red-tailed Hawk

A common species encountered at every part of the range visited by our parties, except at the very highest altitudes above 9000 feet. Individuals were seen circling over the desert at the mouth of Palm Cañon, and at the upper limit of Transition, just below Round Valley. No nests were found, but full grown young, two or three together, attended by the old birds, were seen at Kenworthy on June 5, and near Vandeventer Flat, June 25 and July 2.

No specimens were preserved.

***Buteo swainsoni* Bonaparte**

Swainson Hawk

A dark-colored hawk, doubtfully identified as of this species, was seen at Kenworthy, May 22. At Hemet Lake, August 7, two were seen under circumstances permitting of absolute recognition, though neither was secured. One was very dark colored, the other in the light phase, showing the white throat and dark pectoral band peculiar to the species.

***Aquila chrysaëtos* (Linnaeus)**

Golden Eagle

From the number of birds seen it seemed probable that there were several pairs of eagles breeding in the region covered by us. Individuals were observed many times, at the San Gor-

gonio base of the mountains, at points in Hemet Valley, on Santa Rosa Mountain, at Deep Cañon, at Vallevista, and one bird, on July 7, quite fittingly circling over the very summit of San Jacinto Peak.

A nest was found May 20 in a narrow, rocky cañon near Cabezon. It was placed on a small ledge projecting from an almost perpendicular cliff, about 150 feet from the bottom of the cañon. The structural material was sticks and twigs solely, large, heavy branches in the outer walls (greasewood branches three feet long being distinguished), and smaller twigs interiorly, the whole mass being about four feet in diameter and from two to three feet thick. The single young bird it contained (no. 2134), much too small to fly, was fairly well covered with feathers, but with the natal down projecting between the feather tracts.

But one of the parent birds was seen, circling far overhead, and never venturing very near. In the nest were the fragmentary remains of a skunk (*Meophitis*).

About the camps at Snow Creek, Cabezon and Banning, eagles were seen daily, but it is probable that the Cabezon pair covered at least this much territory in their foraging, so that the same birds may have been seen over and over again.

On Santa Rosa Mountain, June 28 and on several subsequent occasions, two full-grown young and their parents were seen circling about, or sitting in the three tops. In all probability the young had been hatched somewhere in the vicinity.

***Falco mexicanus* Schlegel**

Prairie Falcon

Observed only on the desert side of the range, single birds being seen at Dos Palmos, on May 27, at the mouth of Palm Cañon, June 15, and at Black Hill (near Dos Palmos), June 18. The species probably breeds in the region.

***Falco peregrinus anatum* Bonaparte**

Duck Hawk

Encountered on three occasions. On June 2 one was seen passing swiftly overhead on the trail a few miles east of Vandeventer Flat, at close enough range for us to determine with

certainty that the bird was of this species and not the somewhat similar *F. mexicanus*. At Hemet Lake one was secured on August 8, and another seen on August 10.

The specimen taken (no. 2941) is a male in immature plumage. The stomach contained the remains of a small finch, apparently *Amphispiza belli*, swallowed feathers and all.

Falco sparverius sparverius Linnaeus

Sparrow Hawk

A fairly common species in the mountains, through Upper Sonoran and into Lower Transition, sparingly at higher elevations. On the Pacific slope it was seen at various points in Hemet Valley, Schain's Ranch, Poppet Flat, Thomas Mountain, Strawberry Valley, and one bird at Round Valley on July 11. At the San Gorgonio base a few were seen about Banning and Cabezon, in May and June. At the desert base they were rare. A noisy pair was seen hovering about a rocky cliff at the mouth of Palm Cañon, June 15. Later in the season, August 23 to 27, when birds were scattering more widely, several were met with in the vicinity of Dos Palmos.

Three specimens were preserved: no. 1776, adult male, Schain's Ranch; no. 2574, adult female, Strawberry Valley; and no. 2575, immature male, Strawberry Valley. The two adults, shot on June 27 and July 10, respectively, are in excessively worn plumage; the immature, shot July 16, is full grown, and in fresh first annual plumage.

Aluco pratincola (Bonaparte)

Barn Owl

At the Banning camp, on June 7 and again on June 10, barn owls were heard calling at night. At Hemet Lake, August 6 to 16, barn owls were frequently heard at night, and on August 11 one was flushed from a pine tree near the upper end of the lake.

Asio wilsonianus (Lesson)

Long-eared Owl

Seen but once, at Round Valley, 9000 feet, on July 27, when a family of four was routed out of a dense clump of willows at

the edge of the cienaga. Three were secured, one adult female (no. 3456) and two immature males (nos. 3454, 3455). All were in freshly molted plumage, the two young ones still showing slight traces of down about the head.

These birds, were, of course, wanderers from a lower elevation, but it is of interest that the individuals composing the family should have clung together in their wanderings. This species however, is known to be rather more gregarious than most owls.

***Strix occidentalis occidentalis* (Xantus)**

Spotted Owl

Call notes, undoubtedly uttered by individuals of this species, were heard in Strawberry Valley on the evenings of July 15, 16, and 30, and at Thomas Mountain, on the evening of August 18. At the former place the calls were all heard issuing from the same spot, a point on the steep, heavily wooded hillside bounding the east side of the valley, about a mile above the Idyllwild resort. At Thomas Mountain they were heard just once, on the wooded slopes surrounding the spring where we camped.

***Otus asio bendirei* (Brewster)**

California Screech Owl

Though not seen at any time during the summer, the presence of this species in the mountains was attested by unmistakable notes heard at night at various scattered points. Places where it was thus recorded are as follows: Cabezon, May 9 and 14, Banning, June 10, Santa Rosa Peak, June 29, Strawberry Valley, July 4, and at Hemet Lake several times from August 5 to 14.

***Bubo virginianus pacificus* Cassin**

Pacific Horned Owl

Heard calling at various points in the mountains, but seen on only two occasions, one at Kenworthy on the evening of June 2, and another at the brink of Deep Cañon, August 26. Horned owls were heard hooting at night at Cabezon, May 12, Banning, June 9, Kenworthy, in May and June, Garnet Queen Mine, in

June, Strawberry Valley and Fuller's Mill in July, and at Hemet Lake during the first two weeks in August. One or two unmistakable horned owl feathers were picked up on June 15, in a dense tangle of shrubbery at the mouth of Murray Cañon, just above the floor of the desert.

***Speotyto cunicularia hypogaea* (Bonaparte)**

Burrowing Owl

A common species in the lowlands on the Pacific side of the mountains, and in San Geronio Pass to the north, but apparently very rare or entirely absent on the desert side of the range, and not encountered by us higher than the very base of the mountains. It is abundant on the extensive grain fields of San Geronio Pass, as at Banning, where it was observed daily; beyond that point, where desert brush replaces the cultivated fields, it becomes more rare, though seen as far as Cabezon.

On the west side of the range, at Vallevista, several were seen on the stubble fields or near the edge of the adjoining brush land. It is an abundant species farther out on the extensive plains forming the San Jacinto Valley.

Four specimens were preserved, two adult males, one from Cabezon, May 23 (no. 2129), and one from Banning, June 12 (no. 2053), and two immature females from Vallevista, September 2 and 4 (nos. 3092, 3093). The two latter are in fresh fall plumage.

***Geococcyx californianus* (Lesson)**

Road-runner

Observed at but one point within the mountains, at Kenworthy (altitude 4500 feet), where, on May 27 and 28, one was noted "singing" near the base of the hills. It is not probable that the species ranges to a much higher altitude in these mountains. On the desert slope of the Santa Rosa Mountains, the last week in May, and about the middle of June, single birds were seen from time to time. They were encountered at Cabezon in May, at Whitewater in June, and at Vallevista in September.

One specimen was preserved, a half-grown juvenal taken at Whitewater on June 5 (no. 2072).

Ceryle alcyon (Linnaeus)

Belted Kingfisher

Seen at but one point, at Cabezon, where, on May 22, an adult female, undoubtedly a migrant, was secured (no. 2130). The stomach of this bird contained grasshoppers and the bones of some small vertebrate. There are no fish in the small streams of the vicinity.

Dryobates villosus hyloscopus Cabanis & Heine

Cabanis Woodpecker

Abundant throughout the timbered portions of the mountains; seen in some numbers at every point visited, from Hemet Valley up to the summits of San Jacinto and Santa Rosa peaks. Points of record are: Kenworthy, Hemet Lake, Thomas Mountain, Schain's Ranch, Strawberry Valley, Tahquitz Valley, Round Valley, San Jacinto Peak, and Santa Rosa Peak. Nine specimens were preserved, two adults, six juvenals, and one immature in first winter plumage (nos. 2075, 2282, 2580-2582, 2866-2868, 2951).

After the first of July the young birds were much in evidence everywhere. The one immature (no. 2151, ♀), taken at Hemet Lake, August 7, has quite completed the molt from the juvenal to the first winter plumage.

Dryobates scalaris cactophilus Oberholser

Cactus Woodpecker

Of general distribution on the lower slopes of the desert side of the mountains, though apparently nowhere very abundant. The only breeding species of woodpecker in the region it inhabits. Observed at the following points: Snow Creek, Cabezon, Dos Palms, Palm Cañon (up to 3500 feet), all in the Lower Sonoran zone. It was conspicuously associated with the agave belt, the dried stalks of this plant and the yucca affording nesting sites in a region that is practically treeless. The birds forage freely on low bushes and cactuses, and are thus independent of trees, but require some larger woody growth in which to bore their nesting holes. An unoccupied cavity was found at

Dos Palmos, June 1, in a dead yucca stalk, about five feet from the ground. An occupied nest was discovered in Palm Cañon, at about 3000 feet, on June 14, placed in a dry last year's yucca stalk about ten feet high and four and a half inches in diameter at the base. The entrance was forty-five inches above the ground, the total depth of nest cavity, twelve and three-quarters inches, and the diameter of the entrance one and one-half inches. It contained three small young, scantily covered with partly unsheathed feathers.

Along the railroad near Cabezon many telegraph poles were drilled into by these woodpeckers. From the number of perforations observed in a short distance the damage from this source must be of considerable magnitude, as the poles used here are so small as to be materially weakened by a cavity of the size of a woodpecker hole.

The species was rather unexpectedly encountered at Vallevista, at the Pacific base of the mountains. About six or seven of the birds were seen here between August 29 and September 5, all in the chaparral-covered washes and on the mesa near the foot of the hills. The surroundings are essentially desert-like, but it is doubtful if such conditions prevail in any continuous strip connecting this area with the desert proper east of the mountains. From the season at which these woodpeckers were observed here, they might be assumed to be wandering individuals, straying at random; but in this connection, and arguing against this assumption, it is interesting to note that certain other desert forms, a chipmunk (*Ammospermophilus leucurus*) and a lizard (*Callisaurus centralis*), both certainly non-migratory, were also taken at this point (see page 326).

In all, twenty specimens of this woodpecker were collected, as follows: Cabezon, nine (nos. 1702-1710), Snow Creek, five (nos. 2062-2064, 2152, 2153), Palm Cañon, three (nos. 3084, 3085, 15473), and Vallevista, three (nos. 3113-3115). Ten are adults, nine juvenals, and one an immature in first winter plumage. Very small young ones were taken from a nest on June 14, as mentioned above, but other juvenals were shot, while flying about, and, except on close scrutiny, indistinguishable from adults, as early as May 15, at Cabezon, and May 27 at Snow Creek.

The adults, compared with a small series of topotypes of *D. s. cactophilus* from Tucsón, Arizona, and with others from southeastern Arizona show some difference in the size of the bill, the San Jacinto birds having this member appreciably longer and heavier. Other birds in the Museum collection from Mecca, Riverside County, California (on the Colorado Desert), and a series from the Colorado River between Needles and Yuma, are also of this larger-billed form, as compared with birds from southeastern Arizona. The birds occupying the Colorado Desert region in California, are thus intermediate in this respect, between typical *cactophilus* and the larger-billed *D. s. cremicus* of northern Lower California (see Oberholser, 1911, pp. 151, 152), and not typically representative of *D. s. cactophilus*.

***Dryobates nuttalli* (Gambel)**

Nuttall Woodpecker

A decidedly uncommon species in the San Jacinto Mountains. Observed by us in limited numbers, and at but a few points, always in oak timber, in Upper Sonoran or the lower part of the Transition zone. Two broods, following the parent birds through the trees, were seen in the vicinity of our camp at Garnet Queen Mine, July 2; occasionally single birds were observed elsewhere: at Vandeventer Flat, May 25, at Oak Tree Spring (in the hills about midway between Kenworthy and Palm Cañon), June 11, in Strawberry Valley, July 22, at Hemet Lake (two seen between August 5 and 14), at Thomas Mountain (two seen between August 16 and 21), and at Schain's Ranch, June 18 to 28.

Four specimens were secured (nos. 1789-1791, 2395), three from Schain's Ranch, two full-grown juvenals, June 18 and 26, and an adult male June 28; and a full-grown juvenal from Garnet Queen Mine, July 2.

***Xenopicus albolarvatus gravirostris* Grinnell**

Southern White-headed Woodpecker

A fairly common species in Transition, occurring less commonly above this zone, and not observed at all below. Thus in the San Jacinto Mountains it has a discontinuous range, occu-

pying three separated areas—the slopes and valleys south and west from San Jacinto Peak, down to about 6000 feet, a limited territory about the summits of Santa Rosa and Toro peaks with their connecting ridge, and the top of Thomas Mountain.

In Strawberry Valley white-headed woodpeckers were fairly common on the broken ground at the bases of the surrounding mountain sides, but were not seen out in the middle of the valley. In Round Valley and in Tahquitz Valley they were not common, though seen occasionally; on August 1 a few were noted on some high ridges just below San Jacinto Peak. Although the territory occupied by this woodpecker on Santa Rosa Mountain and on Thomas Mountain is limited in extent, the species was abundant at both places, more individuals being seen at these points than in any other areas of similar extent.

Several of the birds collected were redolent of the wood ants upon which they had been feeding; the plumage is more or less stained and gummed with pitch from the trees they frequented.

On Santa Rosa and Toro young in the nest holes were observed June 30; full grown young flying about in the timber, but attended by their parents, were secured at Fuller's Mill, July 3, at Strawberry Valley, July 7, and at Round Valley July 9.

Specimens were secured as follows: Fuller's Mill, five (nos. 1992-1996), Dutch Flat, one (no. 2146), Strawberry Valley, two (nos. 2576, 2577), Round Valley, three (nos. 2186-2188), Thomas Mountain, three (nos. 3018-3020), Santa Rosa Peak, four (nos. 2419, 2422-2424), Toro Peak, two (nos. 2420, 2421), twenty in all.

Examination of all the adults of *Xenopicus* now available from southern California, in comparison with lately acquired material from the Sierra Nevada, shows the large bill of the former to be constantly diagnostic. In other words, the existence of the race *gravirostris* is confirmed.

***Sphyrapicus varius daggetti* Grinnell**

Sierra Red-breasted Sapsucker

Evidently a rare species in the mountains, or at any rate so quiet and secretive as to elude observation readily. Seen only at Fuller's Mill (6000 feet), and at Tahquitz Valley (8000 feet).

At the former point an adult female was secured (no. 1997), at the latter an adult male (no. 2854) and two full-grown juvenals (nos. 2853, 2855). Several others were seen in Tahquitz Valley, always in the clumps of willows bordering the marshy cienagas. One such thicket had been worked upon by the sapsuckers until almost entirely destroyed, though the surrounding shrubbery was untouched, a parallel instance to the one described from the San Bernardino Mountains (see Grinnell, 1908, p. 63). Several adults were seen in this thicket, and one of the juvenals secured there, but as a rule the birds quietly slipped out on the far side of the bush before they could be approached closely. For the use of the name *daggetti* see Swarth (1912, p. 35).

***Sphyrapicus thyroideus* (Cassin)**

Williamson Sapsucker

A very few were seen and heard in Tahquitz Valley, July 19 to August 5, and in Round Valley, July 6 to 12. They were evidently uncommon in the mountains, and the few seen were difficult of approach.

Five specimens were secured, an adult male, two adult females, and a juvenal male from Round Valley, and a juvenal male from Tahquitz Valley (nos. 2077, 2078, 2189, 2190, 2852).

***Melanerpes formicivorus bairdi* Ridgway**

California Woodpecker

Seen in moderate numbers at various points, all below 7000 feet, and almost invariably in large oak timber. Exact points of occurrence are: Stage road along San Jacinto River, at about 3000 feet, May 19; Kenworthy, a few seen in the hills on the west side of the valley, June 4; Vandeventer Flat, June 23, several; Schain's Ranch, June 17 to 29, seen daily; Poppet Flat, June 20 and 24, numerous; Fuller's Mill, June 30 to July 5, seen daily; Strawberry Valley, July, abundant; Hemet Lake, August 5 to 15, a few seen or heard at various times; Thomas Mountain, August 16 to 21, abundant. Thomas Mountain, altitude 6800 feet, is the highest point at which the species was noted.

Five specimens were preserved: An adult male from Fuller's Mill (no. 1999), an adult female (no. 2578) and an adult male (no. 2579) from Strawberry Valley, and a juvenal female (no. 3016) and a juvenal male (no. 3017) from Thomas Mountain.

***Colaptes cafer collaris* Vigors**

Red-shafted Flicker

Not abundant anywhere until about the middle of July, when the young birds began to appear, and the adults, freed from the care of their families, wandered more widely and became more conspicuous.

A few were noted at Garnet Queen Mine, and on Santa Rosa and Toro peaks, toward the end of June and the first of July. A nest full of noisy young ones was discovered on the ridge just below Toro Peak, July 1.

In Strawberry Valley, early in July, and in Tahquitz Valley toward the end of the month, flickers were moderately abundant. In Round Valley also, during July, a number were seen. The party ascending the mountains from the San Geronio base first encountered the species at Schain's Ranch (4900 feet), not having observed it at any lower altitude. About Hemet Lake and on Thomas Mountain, during August, they were abundant.

Five specimens were collected: Schain's Ranch, one (no. 1777), Poppet Flat, one (no. 1998), Garnet Queen Mine, one (no. 2386), and Strawberry Valley, two (nos. 2572, 2573).

***Phalaenoptilus nuttalli californicus* Ridgway**

Dusky Poor-will

Observed in small numbers at various scattered localities. These ranged from the Lower Sonoran of the desert to the upper limit of Transition, but the birds seen at the highest altitudes in late summer were probably wanderers from below. The species was definitely recorded (occasionally seen, but more frequently heard calling in the evening or early in the morning) as follows: Cabezon, May 1-25, heard calling almost nightly; Banning, June 8-16, occasionally heard calling; Kenworthy, May 19-July 4, an occasional bird seen or heard calling at long intervals;

Palm Cañon, June 11-18, several seen or heard, from the mouth of the cañon up to about 3000 feet; Garnet Queen Mine, June 25-July 1, several heard; Tahquitz Valley, July 19-August 5, two seen; Dos Palmos, August 22-27, several heard.

Three specimens were secured: an adult male, Kenworthy, June 5 (no. 2276), an adult male, Dos Palmos, August 23 (no. 2495), and a juvenal male, Tahquitz Valley (no. 2851). These examples are all clearly referable to the Pacific Coast race *californicus*, rather than to the larger, paler *nuttalli*, or to the smaller, paler *nitidus*.

***Chordeiles acutipennis texensis* Lawrence**

Texas Nighthawk

Seen at various points in Lower Sonoran on the desert slope of the mountains, nowhere in any abundance. A few were noted along the lower reaches of Palm Cañon, in June, the highest on a ridge above Potrero Spring, about 3500 feet. Near Cabezon, at the San Gorgonio base of the range, several were observed on May 5 and 13. At Kenworthy, late in the evening of May 23, a single nighthawk flew past, sailing close to the ground. This may possibly have been *C. virginianus hesperis*, but the hasty glimpse of the bird obtained in the twilight was insufficient definitely to establish its identity. It was the only nighthawk seen in the higher mountains. At Vallevista, at the Pacific base of the mountains, three Texas nighthawks were observed between August 29 and September 5.

Two specimens were preserved: an adult female, Cabezon, May 16 (no. 1772), and an immature female, Vallevista, September 2 (no. 3098).

***Cypseloides niger borealis* (Kennerly)**

Black Swift

In Strawberry Valley, from July 9 to 16, black swifts were noted overhead almost daily. They were in companies of from two to ten, invariably circling high up in the air, far out of gun range. Peculiarities of color, flight, and notes, however, served to distinguish the species, even at a distance, and there

is no question as to the identification. The white-throated swift (*Aëronautes melanoleucus*), was frequently seen in the same place, occasionally at the same time that the black swifts were under observation, and there was never any difficulty in distinguishing the two species.

The black swifts were noted only during a week of cloudy, showery weather; presumably they fed at other times at too high an altitude to be seen from the valley.

***Chaetura vauxi* (Townsend)**

Vaux Swift

Migrating birds, heading for the coast through San Geronio Pass, were seen daily in some numbers at Cabezon, May 10 to 16. Otherwise observed only at Vallevista, where a single bird was seen August 29, doubtless in the return migration.

Two specimens were taken, at Cabezon, May 10 and 11 (nos. 1711, 1712).

***Aëronautes melanoleucus* (Baird)**

White-throated Swift

An abundant species throughout the San Jacinto Mountains; seen at practically every point visited, and doubtless breeding in suitable spots in all parts of the range. White-throated swifts were seen flying over the meadows in Hemet Valley, over the extreme summits of San Jacinto Peak and Toro Peak, the two highest points in the mountains, and over the desert, below Palm Cañon, Snow Creek, and Cabezon. They were particularly numerous in and about Deep Cañon, in June, the extremely high and precipitous enclosing cliffs supplying an ideal summer habitat.

Three specimens were preserved: an adult female, Cabezon, May 12 (no. 1713), an adult female, Kenworthy, June 3 (no. 2285), and an adult male, Hemet Lake, August 10 (no. 3002). The last is in the midst of the annual molt.

Archilochus alexandri (Bourcier & Mulsant)

Black-chinned Hummingbird

Seen at but a few points, and usually in limited numbers. Single birds (adult males, and hence easily recognized) were noted at Dos Palmos, the last week in May, at Strawberry Valley, July 10, and at Hemet Lake, August 15. The only locality where many were seen was at Hurley Flat, 3500 feet, situated on the north side of the mountains, southwest of Cabezon. Here, on May 9, they were numerous.

Two specimens, both adult males, were collected, one from Hurley Flat, May 9 (no. 1766), and one from Schain's Ranch, June 21 (no. 1963).

Calypte costae (Bourcier)

Costa Hummingbird

By far the most abundant species of hummingbird in the lower parts of the mountains, ranging upward to extreme upper Sonoran, Schain's Ranch, 4900 feet, being the highest point of record. They were fairly common in the brushy hills at Kenworthy, and also about Cabezon at the north base of the mountains, but on the desert side of the range, at Dos Palmos and Palm Cañon, they fairly swarmed in places. Here, in May and June, they were frequenting the thickets of desert willow (*Chilopsis*), at that time in full bloom. Most of the birds seen at these latter points were young of the year. But very few hummingbirds were seen at Dos Palmos upon our later visit, in August.

Nests were found at Cabezon, May 9, with eggs, May 14, building, May 16, with young, and at Kenworthy, May 24, with eggs.

Thirty-seven skins of the species were collected, as follows: Cabezon, six (nos. 1760-1765), Whitewater, two (nos. 2068, 2069), Banning, one (no. 2048), Schain's Ranch, thirteen (nos. 1842-1854), Kenworthy, three (nos. 2346-2348), Dos Palmos, eleven (nos. 2545-2555), Palm Cañon, one (no. 3086).

Calypte anna (Lesson)

Anna Hummingbird

Nowhere abundant, though observed and found breeding in various parts of the mountains. Apparently most numerous on the northern slopes of the range, where they were seen at Cabezon (one bird, May 16), in some numbers at Schain's Ranch, June 16-30, and occasionally at Fuller's Mill, June 31 to July 6. About the summit of Santa Rosa Peak, the last week in June, several were noted. These were probably wanderers from below, but others were seen about half way up the mountain, at the Garnet Queen Mine (altitude 6000 feet), and at this point the species was breeding. A nest was found here, built on the branching limb of a golden oak, overhanging the trail, of the usual structure and covered with lichens. This nest contained two young on June 26.

In Strawberry Valley, in July, some were encountered from time to time, but they were not abundant. A single bird was taken in Round Valley, July 9. At Hemet Lake, August 5 to 15, and on Thomas Mountain, August 16-21, they were seen daily. At Dos Palmos, August 23-27, a few were noted along the creek bottom, though the species had not been seen here on our previous visits early in the summer.

Seven specimens were collected: Schain's Ranch, one (no. 1855), Fuller's Mill, one (no. 2017), Round Valley, one (no. 2171), Santa Rosa Peak, one (no. 2438), Strawberry Valley, three (nos. 2722-2724).

Selasphorus rufus (Gmelin)

Rufous Hummingbird

After the first week in July many hummingbirds of this and the closely related species, *S. alleni*, were seen in the higher parts of the mountains, and during the remainder of our stay here, nearly two months, they continued to be numerous. The two species are so nearly alike that it is ordinarily impossible to distinguish them in life, and we were unable to ascertain their relative abundance; but of the specimens obtained the majority are *S. rufus*. There can be no doubt that neither breeds in the

region; both are transients, wanderers, attracted to the higher mountains by the abundance of wild flowers there at a time when the valleys are parched and barren.

Necessarily lumping the two, through the impossibility of distinguishing them, we made field observations as follows: Strawberry Valley, July 9, one immature seen; Round Valley, July 6-12, abundant; Tahquitz Valley, July 19 to August 15, abundant; on the summit of San Jacinto Peak, July 27, one seen; Thomas Mountain, August 16 to 21, seen daily.

Specimens referable to *Selasphorus rufus* were collected as follows: Tahquitz Valley, three (nos. 2762, 2764, 2765), Round Valley, two (nos. 2173, 2174), and Thomas Mountain, one (no. 3031).

***Selasphorus alleni* Henshaw**

Allen Hummingbird

Three specimens unequivocally belonging to this species were collected: no. 2172, adult male, Round Valley, July 10; no. 2760, adult male, Tahquitz Valley, July 20; and no. 2761, immature male, Tahquitz Valley, July 21.

***Stellula calliope* (Gould)**

Calliope Hummingbird

While this species probably breeds in the San Jacinto Mountains, we obtained no positive evidence to this effect, our few records being of individuals that might have wandered from distant points. An adult male was seen at Kenworthy, May 20, undoubtedly out of its nesting range at this low altitude. Two specimens were collected, an immature female at Round Valley, July 7 (no. 2175), and an immature male at Tahquitz Valley, July 20 (no. 2763), both feeding in company with the numerous rufous and Allen hummingbirds which had just invaded the mountains, and possibly likewise migrants from a distance.

***Tyrannus verticalis* Say**

Western Kingbird

Abundant in the lower valleys, and breeding in the mountains in Hemet Valley, and noted in June at Kenworthy and

Vandeventer Flat. Observed in some numbers at Cabezon and Snow Creek in May, and at Banning in June. In the late summer they became still more numerous, and more widely spread, being met with at as high an elevation as Tahquitz Valley (8000 feet), where two were seen on July 20. Particularly abundant at Hemet Lake, August 5-15, where they were feeding in the open meadows surrounding the lake.

Four specimens were preserved, one from Cabezon, May 24 (no. 2131), two from Snow Creek, June 1 and May 31 (nos. 2147, 2148), and one from Hemet Lake, August 9 (no. 2986). The last mentioned, an adult female, is in exceedingly frayed plumage, but has not yet begun to molt.

***Myiarchus cinerascens cinerascens* (Lawrence)**

Ash-throated Flycatcher

An abundant migrant throughout the region, and breeding commonly from the base of the mountains at least as high as Strawberry Valley (6000 feet). A pair was seen at Garnet Queen Mine, 6000 feet, where it was probably nesting, but others observed a few days later on the summit of Santa Rosa Mountain, 2000 feet higher, were, with little doubt, wanderers from lower points. At Cabezon, early in May, and at Dos Palmos the end of May, they were migrating in considerable numbers. At Kenworthy, June 8, a pair was seen carrying building material, and on June 14, in Palm Cañon at about 3000 feet, an occupied nest was found. By the first week in July the young began to appear.

In August migrating birds were abundant, at Hemet Lake, Dos Palmos and Vallevista, a large proportion evidently young of the year.

Twenty-five specimens were collected: Snow Creek, three (nos. 2149-2151), Cabezon, three (nos. 1679-1681), Schain's Ranch, five (nos. 1926-1930), Fuller's Mill, one (no. 2000), Dos Palmos, five (nos. 2496-2500), Strawberry Valley, five (nos. 2586-2590), Hemet Lake, two (nos. 2983, 2984), Vallevista, one (no. 3127).

Sayornis sayus (Bonaparte)

Say Phoebe

Probably breeds along the eastern base of the mountains, though we failed to find it doing so in the few places where it was encountered. Observed as follows: a few seen the first week in May in the vicinity of Cabezon; a single bird observed singing on the brink of Deep Cañon (3000 feet), May 31; a full-grown juvenal secured at Vandeventer Flat, July 2, undoubtedly a wanderer from the desert below; numerous about Hemet Lake in August, when the late summer dispersal was well under way.

Two specimens were collected, both full-grown juvenals: Vandeventer Flat, July 2 (no. 2295), and Hemet Lake, August 11 (no. 2987).

Sayornis nigricans (Swainson)

Black Phoebe

Distributed over the lower parts of the range, nowhere abundant, but present at all suitable spots. At Kenworthy on June 5 a nest which the young had just left was found at the entrance of a small tunnel.

Found nesting in Strawberry Valley, 6000 feet, probably the uppermost breeding limit of the species in these mountains. Here, on July 17, a nest was found built on the window casing of a deserted cabin, and containing four half-grown young. Although no nests were discovered on the desert side of the range the presence of a single bird in Palm Cañon at about 3000 feet, on June 13, two families at the mouth of Palm Cañon, June 14, and a single bird by one of the pools in Deep Cañon, June 21, may be taken as evidence of the probable breeding of the species at these points. Adults, apparently breeding, were taken at Cabezon in May, where, however, they were not common.

In the late summer they increased in numbers, and also wandered to higher elevations, being seen in July in Tahquitz Valley (8000 feet) and in Round Valley (9000 feet). They were particularly abundant about the shores of Hemet Lake, in August.

Eleven specimens were collected: Cabezon, two (nos. 1700, 1701), Schain's Ranch, one (no. 1787), Poppet Flat, one (no. 2002), Strawberry Valley, two (nos. 2591, 2592), Round Valley, two (nos. 2216, 2217), Hemet Lake, one (no. 2988), and the mouth of Palm Cañon, two (nos. 3076, 3077).

Nuttallornis borealis (Swainson)

Olive-sided Flycatcher

Observed in some numbers over most of the range, migrating at the lower levels in May and June, and later on found breeding at the higher points visited. In Hemet Valley, at Kenworthy and Vandeventer Flat, they were seen migrating up to June 2. On the north slopes of the mountains, at Cabezon in May, and at Snow Creek the first week in June, they were daily seen passing through. Birds observed at Fuller's Mill toward the end of June, on Santa Rosa Peak at the end of June, in Strawberry Valley, Tahquitz Valley, and Round Valley, in July, were undoubtedly nesting. In Strawberry Valley a nest was found on July 9, placed in a small clump of mistletoe near the end of a drooping cedar bough, about twenty feet above the hillside. It was not looked into, but probably contained young, as one of the parents arrived with insects in its bill.

In August they were seen about Hemet Lake, evidently beginning to wander from the breeding grounds, and also on Thomas Mountain. None was encountered at any time along the desert base of the mountains, at Dos Palmos or in Palm Cañon, though they might be expected to occur there during the migrations.

Ten specimens were collected: Cabezon, seven (nos. 1672-1678), Vandeventer Flat, one (no. 2302), Santa Rosa Peak, one (no. 2470), and Strawberry Valley, one (no. 2585).

Myiochanes richardsoni richardsoni (Swainson)

Western Wood Pewee

A common species, nesting in abundance from high Upper Sonoran upwards. At lower points it was encountered migrating in some numbers, at Cabezon early in May, at Dos Palmos from May 26 to June 1, and at Snow Creek and Whitewater, June

3. At Kenworthy (4500 feet) a nest was found in course of construction on June 9. Other nests were found, one building at Garnet Queen Mine, June 26, and one with three eggs at Fuller's Mill, June 22. At various collecting stations in higher parts of the range, Santa Rosa Mountain, Strawberry Valley, Tahquitz Valley, and Round Valley, the birds were everywhere numerous, usually along the water courses. At Hemet Lake and on Thomas Mountain, in August, they were also abundant.

Twenty-three specimens were collected: Snow Creek, three (nos. 2143-2145), Cabezon, three (nos. 1682, 1683, 1685), Hurley Flat, one (no. 1684), Schain's Ranch, five (nos. 1913-1917), Fuller's Mill, one (no. 2001), Strawberry Valley, two (nos. 2583, 2584), Tahquitz Valley, one (no. 2803), Round Valley, two (nos. 2110, 2215), Thomas Mountain, one (no. 3036), Vandeventer Flat, one (no. 2303), Garnet Queen Mine, two (nos. 2474, 2475), and Dos Palmos, one (no. 2506).

***Empidonax difficilis difficilis* Baird**

Western Flycatcher

Found breeding in small numbers at a few points in high Upper Sonoran and in Transition, usually being seen or heard in the dense vegetation along the streams. Migrating birds were taken at Cabezon early in May, and at Dos Palmos the end of May. A few belated migrants were noted at the desert base of the mountains the middle of June, one taken at Palm Cañon (3000 feet), June 13, one taken at the mouth of Palm Cañon, June 15, and one heard at Banning, June 10.

At Garnet Queen Mine a few were seen, and on June 26 a nest was found containing three small young, the nest being placed in the end of a broken-off log, about eight feet above the bed of the stream.

In Strawberry Valley, in July, a few of the birds were seen or heard daily along the streams. Occasional birds beginning to appear in Tahquitz Valley at the end of July were probably wanderers from lower points. On Thomas Mountain, August 16-21, they were noticeably abundant.

Twenty-one specimens were collected, eighteen skins, as follows: Cabezon, three (nos. 1697-1699), Snow Creek, one (no. 2139),

Strawberry Valley, four (nos. 2593-2595, 2606), Tahquitz Valley, two (nos. 2801, 2802), Thomas Mountain, four (nos. 3038-3041), Garnet Queen Mine, two (nos. 2460, 2461), Dos Palms, one (no. 2507), Palm Cañon, two (nos. 3079, 3080); and three newly hatched young taken at Garnet Queen Mine, and preserved in alcohol (no. 15475).

***Empidonax trailli trailli* (Audubon)**

Traill Flycatcher

Seen only on the desert side of the mountains until the late summer movement began, when they appeared in numbers at other points. Migrating birds were taken at Cabezon in May. At Dos Palms at the end of May, they were present in some numbers, migrating as we supposed; but since many more were seen at the same spot the third week in June, they were possibly breeding. Here they frequented the thickets of desert willow marking the course of Carrizo Creek. We found them in very similar surroundings in Palm Cañon, the middle of June, at the mouth of the Cañon and at various points up to about 3000 feet.

During the first two weeks in August they were noticeably abundant at Hemet Lake, the following week (August 16-20) a number were seen on Thomas Mountain (altitude 6800 feet), and later, August 22-27, many were observed along Carrizo Creek, below Dos Palms.

Nineteen specimens, all adults, were preserved: Cabezon, six (nos. 1686-1691), Snow Creek, three (nos. 2140-2142), Banning, one (no. 2052), Dos Palms, five (nos. 2501-2505), Palm Cañon, one (no. 3078), Hemet Lake, two (nos. 2989-2990), and Thomas Mountain, one (no. 3037).

***Empidonax wrighti* Baird**

Wright Flycatcher

The status of the species of small flycatcher breeding in the Boreal zone of the mountain ranges of southern California is a problem that can not yet be considered satisfactorily solved, in spite of the large amount of material accumulated during the last few years. It seems apparent, however, that the breeding

bird of this region is not *Empidonax griseus* Brewster, as it has heretofore been considered. Large, gray-colored birds apparently referable to this latter species occur regularly in southern California during the migrations, and in winter, but are never seen during the breeding season nor in the high mountains, while, on the other hand, individuals of the *wrighti* type are of extremely rare occurrence away from their nesting ground in the Boreal zone. The fact that the wandering examples of *griseus* are usually in quite fresh plumage, while of the summer specimens of *wrighti* in our collections a large proportion are juvenals, and the adults mostly in very worn condition, though the color differences are thereby accentuated, gave the impression that these differences were mostly seasonal, or from wear. All the southern California breeding birds, however, are of the smaller size, with shorter, broader bill, and brown-colored lower mandible, characteristic of *wrighti*, while the migrants from the lowlands of the region which we now regard as examples of *griseus*, are of larger size, with longer and more slender bill, and with light-colored lower mandible.

It appears, therefore, that both species occur in southern California, *griseus* as a regular but rather uncommon migrant and winter visitant in the valleys, more commonly on the desert, and *wrighti* as an abundant summer visitant in the comparatively limited area of high Transition and Boreal of the mountains. The fact that the latter species is of exceedingly rare occurrence, almost unknown, in the lowlands of the region, points to similar habits of migration to those of *Passerella i. stephensi*, and *Oreospiza chlorura*, occupying precisely the same summer habitat. All three species depart from the region in fall and enter again in the spring, without visiting the adjacent plains and valleys.

The similarity of *wrighti* and *griseus*, both in appearance and habits, is such as to have caused them for years to be confused, but there is little doubt but that there are two such distinct forms, though the occurrence of numerous individuals with difficulty allotted to one or the other species seems to indicate the possibility of intergradation between them. Such intergradation, indeed, was pointed out by Brewster (1889, p. 88), in his descrip-

tion of *E. griseus*, not only between *griseus* and *obscurus* (= *wrighti*), but also between *obscurus* and *hammondi*, extremely small, dark-colored examples of *hammondi* at the one extreme, and large gray-colored specimens of *griseus* at the other, with *wrighti* occupying middle ground; all of which is abundantly illustrated in the collections of this Museum. As pointed out by the above author, however, species of *Empidonax* with difficulty distinguished in the cabinet skin, may be perfectly distinct forms, and it seems advisable for the present to treat the above three species as such.

Apparently nothing is known of the nesting habits of *E. griseus*, the published breeding ranges being merely general statements, with no precise data to support them. The observed facts bearing on the migration and winter home of the species do not tend to shed any light on the probable breeding ground of this large, pale-colored *Empidonax*. It is generally stated to breed commonly in southern Arizona, on just what grounds is unknown to us, but in this connection mention of a specimen in juvenal plumage (no. 5865, coll. H. S. Swarth), apparently referable to *E. griseus*, taken in that region, may be of interest. This bird, a juvenal female, was secured in the foothills of the Huachuca Mountains, October 1, 1907, evidently a very late-hatched bird, and in itself no proof whatever of the species breeding in the immediate vicinity. Compared with juvenals of *wrighti* it shows differences exactly comparable with those distinguishing adults of the two forms—decidedly grayer coloration, and longer, more slender bill, with conspicuously lighter colored lower mandible. It is quite unlike any juvenals at hand from the mountains of southern California, and the Museum contains a number in comparable plumage. These well-marked characters appearing in the juvenal plumage strongly support the idea of the specific distinction of *E. griseus*.

The Wright flycatcher was found breeding in abundance in the higher parts of the San Jacinto Mountains. On Santa Rosa Mountain it occurred down to the lowest edge of Transition, there sharply defined, numbers of the birds being seen or heard at the Garnet Queen Mine, altitude 6000 feet. On the higher slopes of Santa Rosa Peak and Toro Peak, though present, it was much

less numerous. The species was not observed in Strawberry Valley, low Transition and practically the same elevation as the Garnet Queen Mine, though found at Fuller's Mill nearby; two thousand feet higher, in Tahquitz Valley, and from there upwards, it was a very common species. Some of the birds were seen but a few hundred feet below the summit of San Jacinto Peak.

In Round Valley during the first two weeks in July they were common. A nest was found here on July 10, containing on this date four newly hatched young. It was placed in a gooseberry bush, about two feet above the ground, and was imperfectly concealed. In Tahquitz Valley toward the end of July, the birds were abundant, the broods of young being now out of the nests, and perched in the trees and bushes, attended by their parents.

Specimens were collected as follows: Cabezon, one (no. 1695); Garnet Queen Mine, Santa Rosa Mountains, three (nos. 2462-2464); Fuller's Mill, three (nos. 2003-2005); Tahquitz Valley, sixteen (nos. 2828-2832, 2834-2836, 2838, 2839, 2843-2845, 2856-2858); Round Valley, twelve (nos. 2106-2109, 2218-2221, 2837, 2840-2842), San Jacinto Peak, one (no. 2833), thirty-six in all. Twenty-one of these are adults, fifteen in juvenal plumage. One of the adults, no. 2841, Round Valley, July 27, has begun the annual molt, patches of new feathers appearing on the breast, dorsum and crown, and the new plumage is noticeably dark in coloration, very different indeed from fall specimens of *E. griseus*.

***Empidonax griseus* Brewster**

Gray Flycatcher

The collection includes four small flycatchers taken near Cabezon, at the northern base of the mountains, which we have, with some hesitation, placed in a different category from the breeding *E. wrighti* of the higher elevations. These birds (nos. 1692-1694, 1696) were collected, the first three on May 4, the last on May 16, and were, of course, transients at this locality. In pale coloration and color of bill they are referable to *griseus*,

though none presents the extreme of characters of that race, and they may possibly be merely intergrades, or individual variants. At the same time (May 14) a typical example of *E. wrighti* was taken at the same place.

Otocoris alpestris actia Oberholser

California Horned Lark

Abundant on the extensive flats of upper Hemet Valley, at Hemet Lake, Kenworthy, and east nearly to Vandeventer Flat. At Kenworthy in June large flocks of old and young together were to be seen everywhere on the pasture land. A very few were noted at points on the desert side of the San Geronio Pass, three or four at Cabezon, May 4, and another small flock at Whitewater, May 25, at both places in small cultivated patches of ground. In the stubble fields about Banning, and from there westward, it was a very abundant species.

Six specimens were preserved: one from Banning (no. 2051), and five from Kenworthy (nos. 2296-2300), all adults.

Cyanocitta stelleri frontalis (Ridgway)

Blue-fronted Jay

Notably abundant in Strawberry Valley, much more so than at any other point visited. At Schain's Ranch, the lower edge of Transition, and at Tahquitz Valley, high Transition, they were present, but in lesser numbers. Very few were noted in Round Valley. On Santa Rosa Mountain they were also exceedingly scarce. At Hemet Lake, early in August, and on Thomas Mountain a little later, they were seen daily, at that time probably beginning to scatter out more widely over the mountains.

Twenty-seven specimens were preserved from the following points: Schain's Ranch, two (nos. 1778, 1779); Fuller's Mill, five (nos. 1869-1873); Strawberry Valley, sixteen (nos. 2556-2571); Tahquitz Valley, one (no. 2875); Thomas Mountain, one (no. 3015); Toro Peak, one (no. 2466); Santa Rosa Peak, one (no. 2467).

Of the sixteen specimens taken in Strawberry Valley, a large proportion were killed in rat traps set for flying squirrels in the branches of oak trees.

***Aphelocoma californica californica* (Vigors)**

California Jay

A common species in Upper Sonoran chaparral. Observed in numbers throughout Hemet Valley, at Hemet Lake, Kenworthy, and Vandeventer Flat, and ranging upwards commonly to the altitude of Schain's Ranch (4900 feet), less numerous to that of Garnet Queen Mine (6000 feet). On June 2 many were seen on Piñon Flat. At Dos Palmos they were encountered in small numbers along the creek, at the end of May and early in June, and again at the end of August.

Along the San Gorgonio base of the mountains, at Cabezon, Snow Creek, and Banning, California jays were seen in the brush quite to the foot of the hills, but no farther, none being observed in the brush on the desert floor.

At Kenworthy, toward the end of May, families of small young were frequently met with in the thickets of scrub oak in the valley. At Hemet Lake, in August, specimens of juvenals were taken molting into the first winter plumage; a bird taken at Vallevista September 2 has quite finished the molt.

Eighteen specimens were preserved, as follows: Hurley Flat, one (no. 1745), Schain's Ranch, four (nos. 1918-1921), Kenworthy, seven (nos. 2257-2263), Dos Palmos, one (no. 2494), Hemet Lake, four (nos. 2952-2955), Vallevista, one (no. 3104).

A form of this jay supposed to be distinct from *californica* has of late years come to be recognized as occupying extreme southern California, namely *A. c. obscura* (Anthony, 1889, p. 75). The characters for the distinguishment of this form, as given by the latest critical student of the genus (Ridgway, 1904, p. 330) are, as compared with *A. c. californica*: smaller size (except bill) and darker coloration. We have no material from the San Pedro Martir region, but we do have large series of skins from Monterey and other localities in the type region, together with plentiful material from San Diego County and elsewhere in southern California.

We find that, as regards size, there is no perceptible difference in either mass or proportions. In coloration we have tested for shade of dorsum, shade of blue on wings, head and tail, grayish

tints beneath, and tinge of blue on lower tail coverts. In not one of these respects do we find the least apparent difference, *always taking perfectly comparable specimens into consideration, as regards age and stage of plumage wear.* We cannot help but believe that misinterpretation has resulted from inadequate material; for there is a very great modification of colors through the year accompanying abrasion and fading of the plumage. Furthermore, comparison with birds from the Sierra Nevada area is not pertinent in this connection. Since the name *californicus* was applied to the coast form (Monterey, in the Santa Cruz district), and since, as we are thoroughly convinced ourselves, birds from the San Diegan district and the Santa Cruz district are identical, there is no justification for using the name *obscura* for the southern California *Aphelocoma*.

If distinction is to be made anywhere among these jays in California, separate designation should more properly be given to birds of the Sierra Nevada area, which are somewhat paler and larger than the coast form.

***Corvus corax sinuatus* Wagler**

Western Raven

Not common. Seen in small numbers, single birds or two together, at various times and places, none at a higher elevation than Kenworthy, 4500 feet. At Deep Cañon, June 19, two suddenly appeared, circling overhead while we were working over the carcass of a mountain sheep, though none had been noted during the days previously spent at this point.

Single birds were seen as follows: near Hemet, May 19, at Whitewater, May 1 and June 3, and Cabezon, May 8. One was noted at Kenworthy, June 9, and several, feeding on the carcass of a calf, August 9. Several at Dos Palmos, August 23 to 27.

***Nucifraga columbiana* (Wilson)**

Clarke Nutcracker

Met with in but very small numbers and at few points. During July a few were seen daily in Round Valley and in Tahquitz Valley; one on July 7 at the summit of San Jacinto Peak. In

a damp meadow near the summit of Toro Peak two were seen June 30, and a single bird July 1, the only ones noted in the Santa Rosa Mountains. A solitary straggler taken on the sagebrush flat at Kenworthy, June 8, was the only individual noted below high Transition.

Four specimens were secured: Kenworthy, one (no. 2256), Round Valley, one (no. 2073), Tahquitz Valley, one (no. 2846), and Toro Peak, one (no. 2468). All are adults in rather worn plumage.

Cyanocephalus cyanocephalus (Wied)

Piñon Jay

Seen only in Hemet Valley, where they were at times abundant. At Kenworthy, during the last week in May and the first half of June, large flocks appeared almost every day, feeding on the ground in the sagebrush covered valley. Flocks were encountered between Kenworthy and Hemet Lake, June 6, and at Hemet Lake, August 9.

Eleven specimens were preserved, all taken at Kenworthy (nos. 2239-2249). Three are adults, eight full grown juvenals.

Xanthocephalus xanthocephalus (Bonaparte)

Yellow-headed Blackbird

Observed as a migrant at Cabezón, during May. Four specimens were taken (nos. 1646-1649), an adult male and three females. Not encountered elsewhere.

Agelaius phoeniceus neutralis Ridgway

San Diego Red-wing

Seen only in the vicinity of Hemet Lake. As some were observed in June they were probably breeding on the marshy ground at the head of the lake. In August small flocks were noted here on several occasions.

Sturnella neglecta Audubon

Western Meadowlark

Breeds abundantly in the lower parts of the mountains. In San Jacinto Valley, to the westward, and in San Gorgonio Pass,

to the northward, it was exceedingly numerous, but we did not find it in the desert region at the eastern base of the range. Breeds in numbers as high as Kenworthy and Vandeventer Flat, in Hemet Valley, and at Schain's Ranch, 4900 feet, where breeding birds were taken. In the late summer they were encountered at much higher elevations, at Round Valley, 9000 feet, July 9, and at Tahquitz Valley, 8000 feet, July 20. These were undoubtedly wanderers from below, and not to be supposed to have nested at these altitudes.

Ten specimens were collected: Cabezon, two (nos. 1653, 1654), Whitewater, one (no. 2055), Banning, one (no. 2028), Schain's Ranch, one (no. 1788), Round Valley, two (nos. 2079, 2080), Hemet Lake, one (no. 2950), Kenworthy, two (nos. 2293, 2294).

The two Round Valley specimens, taken July 9, are full grown juvenals. The Hemet Lake example, August 11, is well along in the post-juvinal molt.

***Icterus parisorum* Bonaparte**

Scott Oriole

Occurs in a fairly well-defined area on the desert slope of the mountains, where it was not uncommon. We encountered it at points in Palm Cañon, and in the adjacent Dos Palmos and Piñon Flat regions. Here it occupied the agave belt, about at the point of mergence of Upper and Lower Sonoran, not being once seen in the higher Upper Sonoran of the neighboring Vandeventer Flat and Hemet Valley just above, nor in the Lower Sonoran of the desert foothills just below where the agave was replaced by cholla cactus. It was most abundant in Palm Cañon at about 3500 feet, and at Dos Palmos and Deep Cañon, at about the same altitude. A few were seen on Piñon Flat (4000 feet) and at Asbestos Spring (4500 feet). Omstott Creek, just west of Piñon Flat, is about the western limit of the species in the mountains, though on one occasion, June 23, a bird was heard singing half a mile farther west.

About our camps at Dos Palmos and in Upper Palm Cañon, in May and June, the loud, ringing note of this oriole was one of the most conspicuous audible evidences of bird life. The male

birds were frequently seen, perched on the agaves or flying overhead, but they were remarkably shy, seldom permitting a near approach. In fact, the only specimen secured, an adult male (no. 2485) taken at Dos Palmos June 1, flew into a tree within gunshot of the collector, who was sitting, unobserved, near camp.

At the time of our last visit to Dos Palmos and Deep Cañon, late in the summer, August 22 to 27, the orioles seemed to have already abandoned their breeding grounds, for none was to be seen. To all appearance food was more abundant than earlier in the season, the plentiful summer rains having brought forth an abundance of vegetation, with a corresponding abundance of insect life.

***Icterus cucullatus nelsoni* Ridgway**

Arizona Hooded Oriole

Seen at but a few points, in the lowest parts of the range. On the desert side they were largely confined to the immediate neighborhood of the Washington palms. Thus at Dos Palmos Spring, the last week in May, there was a nest of the Arizona hooded oriole containing small young, in one of the palms by the spring, while the species was not seen elsewhere in the vicinity. At the mouth of Palm Cañon they were common, and breeding in the palm trees, as also at the mouth of Murray Cañon near by. They did, however, ascend Palm Cañon somewhat farther up than the palm trees extended, being seen in cottonwoods at Little Paradise, about 2500 feet.

At Cabezon they were fairly abundant during May; toward the end of the month a number of nests were found, one or two in cottonwoods, but the majority in palm trees on deserted ranches in the vicinity. The species was seen at Banning, June 8, and at Hemet, May 19, undoubtedly nesting at both places.

Five specimens were taken: Cabezon, three (nos. 1726-1728), Snow Creek, one (no. 2155), and Vallevista, one (no. 3126). The Vallevista specimen, taken August 30, is in juvenal plumage throughout.

***Icterus bullocki* (Swainson)**

Bullock Oriole

Common nearly everywhere, up to the lower edge of Transition. Abundant at Cabezon in May, migrating early in the month and found breeding a little later. At Kenworthy they were also numerous in May and June, feeding in the sagebrush to a great extent, and also frequenting the scattered clumps of yellow pines. On June 10 after a high wind, a nest with four broken eggs was found under a pine tree. Also seen at Vandeventer Flat, Banning, Schain's Ranch, and Strawberry Valley, probably breeding at all these points. Single birds noted in Tahquitz Valley, July 25 and 29, were undoubtedly wanderers from lower down.

Eleven specimens were preserved, as follows: Cabezon, three (nos. 1729-1731), Banning, one (no. 2047), Schain's Ranch, one (no. 1786), Kenworthy, four (nos. 2286-2289), Dos Palms, one (no. 2508), and Strawberry Valley, one (no. 2616).

***Euphagus cyanocephalus* (Wagler)**

Brewer Blackbird

Fairly common at many points in the lower parts of the mountains. Breeding colonies were observed at Cabezon, Kenworthy, and Vandeventer Flat. Strawberry Valley, 6000 feet, was the highest point at which the species was encountered in the San Jacintos. Here, in July, flocks of old and young together, frequented the corrals and pastures. At Hemet Lake, early in August, they were abundant.

Six specimens were preserved, three from Cabezon (nos. 1650-1652), and three from Kenworthy (nos. 2290-2292).

***Carpodacus purpureus californicus* Baird**

California Purple Finch

Fairly common in Strawberry Valley during July. The only other places where the species was encountered were a little meadow just below the summit of Toro Peak, where, on July 1, several were seen, and Tahquitz Valley, where two specimens were taken, an adult female, July 20, and a juvenal male, July

29. The latter two were probably wanderers from a lower elevation. Thus the California purple finch was found in the San Jacinto mountains under very similar conditions to those observed in the San Bernardino Mountains (see Grinnell, 1908, p. 88), occurring in both regions in a limited area of low Transition on the Pacific side of the mountains, and preferably in the vicinity of streams. Nine specimens were collected (nos. 2636-2642, 2727, 2731), seven from Strawberry Valley, and two from Tahquitz Valley.

***Carpodacus cassinii* Baird**

Cassin Purple Finch

Fairly common in Tahquitz Valley (8000 feet), and in Round Valley (9000 feet), during July. A single adult male, secured at Fuller's Mill (6000 feet), July 1, was the only one seen at any other point.

In Tahquitz Valley small flocks of full-grown juvenals frequented the grassy meadows. Twelve specimens were preserved: Fuller's Mill, one (no. 1890), lower slopes of San Jacinto Peak, two (nos. 2081, 2082), Round Valley, three (nos. 2083, 2084, 2730), Tahquitz Valley, six (nos. 2726, 2728, 2729, 2732-2734).

***Carpodacus mexicanus frontalis* (Say)**

California Linnet

A common species, encountered in some numbers at every point visited, up to the lower limits of Transition. Nests with eggs or young were found at Cabezon early in May, at Kenworthy toward the end of May, at the mouth of Palm Cañon, and at Dos Palmos and Deep Cañon, in the middle of June, and at Garnet Queen Mine at the end of June. Where houses were available the birds made use of them; thus at Kenworthy and Garnet Queen Mine, nests were placed in niches about the abandoned mine buildings. At the mouth of Palm Cañon, and in Murray Cañon they were built in the palm trees and in caetuses; in Deep Cañon, May 30, a nest with four incubated eggs was found in a cactus.

The highest points at which the species was observed were Strawberry Valley, 6000 feet, where several were seen July 14, Santa Rosa Peak, 7500 feet, where a few visited a water hole at our camp, June 30, and on Thomas Mountain, 6800 feet, where a few were noted at various times from August 16 to 21.

At Vallevista, during the first week in September, they were fairly abundant, and feeding on the ripe fruit of the yucca.

Eleven specimens were preserved, as follows: Cabezon, one (no. 1644), Schain's Ranch, two (nos. 1863, 1864), Banning, one (no. 2046), Snow Creek, one (no. 2168), Kenworthy, two (nos. 2349, 2350), mouth of Palm Cañon, one (no. 3035), Vallevista, three (nos. 3121-3123).

***Loxia curvirostra bendirei* Ridgway**

Sierra Crossbill

In Round Valley, on August 1 and 2, several single birds, and companies of two or three together, were seen and heard, flying to and fro high overhead, and occasionally alighting for a few moments in the tops of the tallest trees. The incessant utterance of the loud call-note made them very conspicuous, but from their continually restless movements it was difficult to secure specimens. One was finally obtained as it darted from a tree top, where it had been calling, unseen, in the heavy foliage. During previous visits to Round Valley, three members of the expedition having established a camp there, July 6 to 12, and two others having visited it on July 27, no crossbills were seen. Had they been present, and acting as they were at the later visit, they could not have been overlooked.

The only other place where the species was observed was at Vallevista, where two were seen on August 31, and another September 3. This record station is extraordinary, the locality being a brush-covered Lower Sonoran sand wash at the base of the mountains; but there is no doubt as to the identity of the birds seen. The first two darted into a pepper tree under which camp was pitched, and sat in full view, calling continuously. They were off again at the first movement of the observer. The other bird seen, circled about overhead, calling at frequent intervals.

The specimen secured (no. 2725) is an adult male, and practically like examples from the San Bernardino Mountains (see Grinnell, 1908, p. 91), and from Mount Pinos (see Grinnell, 1905, p. 385). These birds are all sufficiently distinct both from *Loria c. minor* and *L. c. stricklandi* to justify the use of the name *bendirei* in this connection. They are about intermediate in size between the very small *minor*, represented in the Museum collection by examples from the eastern United States and from the northwest coast, and the very large *stricklandi*, as represented by specimens from the mountains of southern Arizona.

***Astragalinus tristis salicamans* (Grinnell)**

Willow Goldfinch

Seen only along the San Geronimo Pass base of the mountains. They were not numerous there, but small numbers were seen almost daily, at Cabezon during May, and at Banning early in June. A nest was found in an almond orchard at Cabezon. One specimen was preserved (no. 1642), an adult male taken near Cabezon, May 10.

***Astragalinus psaltria hesperophilus* Oberholser**

Green-backed Goldfinch

Fairly common at most points visited up to the lower edge of Transition. Seen during May and June at various points in Hemet Valley between Hemet Lake and Vandeventer Flat. A few were noted about Dos Palms at the end of May and early in June. A nest found in the nearby Deep Cañon, May 30, was placed in one of the few cottonwoods scattered along the bottom of the gorge. Several birds were seen June 15 at the mouth of Murray Cañon, just above the floor of the desert.

Found in abundance along the northern base of the mountains, at Snow Creek, Cabezon, and Banning.

The highest points of record are Strawberry Valley, 6000 feet, Garnet Queen Mine, 6000 feet, and Thomas Mountain, 6800 feet.

Nine specimens were collected: Hurley Flat, one (no. 1643), Fuller's Mill, one (no. 1894), Strawberry Valley, three (nos. 2662-2664), Garnet Queen Mine, three (nos. 2416-2418), and Valle Vista, one (no. 3131).

***Astragalinus lawrencei* (Cassin)**

Lawrence Goldfinch

Observed at various points in the lower parts of the mountains, though seldom seen in any numbers. Most numerous in San Geronimo Pass, at Cabezon and Banning, and also at Schain's Ranch. Not seen at all on the desert slopes, Omstott Creek being apparently about the eastern limit of the species in this region. Found ranging up to the lower edge of Transition, as at Fuller's Mill, Strawberry Valley, and Garnet Queen Mine, all about 6000 feet elevation.

A nest containing young was found at Cabezon, May 4. Full-grown juvenals were taken at Poppet Flat, June 24, and one was seen at Strawberry Valley, July 16.

Fifteen specimens were secured, as follows: Banning, three (nos. 2043-2045), Snow Creek, one (no. 2169), Schain's Ranch, two (nos. 1859, 1862), Poppet Flat, three (nos. 1860, 1861, 1897), Fuller's Mill, two (nos. 1895, 1896), Strawberry Valley, one (no. 2665), Garnet Queen Mine, two (nos. 2374, 2375), Omstott Creek, one (no. 2544).

***Spinus pinus pinus* (Wilson)**

Pine Siskin

An abundant species in the higher parts of the San Jacinto Mountains. A few were seen at Schain's Ranch (4900 feet), and at Fuller's Mill (6000 feet). In Strawberry Valley (6000 feet) they were rather more abundant, while in the higher, Canadian zone valleys, Tahquitz (8000 feet) and Round Valley (9000 feet), numerous flocks were observed daily. A single bird taken near the summit of Santa Rosa Peak on July 1, was the only one seen in this part of the range.

No positive evidence was secured to prove the breeding of this species in the region explored, though the capture of full-

grown juvenals in Round Valley, July 26, and Tahquitz Valley, July 29, might be taken as such.

Small flocks encountered in Strawberry Valley in July were feeding on thistles. At Hemet Lake, August 5 to 14, they were several times noted feeding in weed patches in the open meadows about the lake.

Thirteen specimens were taken: Round Valley, four (nos. 2115, 2201, 2777, 2778), Tahquitz Valley, two (nos. 2776, 2779), Strawberry Valley, five (nos. 2657-2661), Hemet Lake, one (no. 3003), Santa Rosa Peak, one (no. 2425).

***Passerculus sandwichensis alaudinus* Bonaparte**

Western Savannah Sparrow

Several, migrants undoubtedly, were seen in an alfalfa patch near the station at Cabezon, May 4. Small sparrows, not definitely identified but supposed to be of this species, were seen in the grassy fields at the upper end of Hemet Lake on several occasions between August 11 and 15.

***Ammodramus savannarum bimaculatus* Swainson**

Western Grasshopper Sparrow

The discovery of this species breeding in the San Jacinto Mountains was an unexpected result of the season's work. The birds were seen at but one point, in a meadow at Schain's Ranch, altitude 4900 feet, where several were noted, and three secured. The specimens taken (nos. 1799-1801) were an adult male, June 28, and an adult male and a juvenile female, June 29. As several others were seen and as both adults taken were males, there were apparently at least two pairs of the birds with their broods in this little meadow. The young secured is in the streaked, juvenile plumage, and there seems little reason to doubt that it was hatched in the immediate vicinity.

***Chondestes grammacus strigatus* Swainson**

Western Lark Sparrow

A common species in the valleys west of the mountains, extending eastward through San Geronio Pass. Seen in abund-

ance in the latter region as far east as Cabezon. In the mountains proper it was noted in fair numbers at Kenworthy in May and June, and, the highest record station, at Schain's Ranch, 4900 feet, in May.

Eighteen specimens were taken: Cabezon, four (nos. 1622-1624, 2132), Banning, two (nos. 2036, 2037), Snow Creek, one (no. 2167), and Schain's Ranch, eleven (nos. 1815-1825).

***Zonotrichia leucophrys leucophrys* (Forster)**

White-crowned Sparrow

Observed migrating in fair abundance during May, at Cabezon, on the desert side of the range. Seen elsewhere only at Kenworthy, where a single bird was taken May 24. In southern California this species is largely confined to the desert regions east of the mountains, where it is a fairly common migrant. In the Pacific slope valleys it is of decidedly rare occurrence.

Six specimens were taken by the expedition, five at Cabezon (nos. 1617-1621), and one at Kenworthy (no. 2355).

***Spizella passerina arizonae* Coes**

Western Chipping Sparrow

An abundant species in the higher parts of the mountains. Seen commonly from the altitude of Schain's Ranch (4900 feet) and Strawberry Valley (6000 feet) upward on San Jacinto Mountain, and from Garnet Queen Mine (6000 feet) upward on Santa Rosa Mountain. Not seen in Hemet Valley until after the termination of the nesting season. Early in August flocks composed largely of juvenals were noted in weed-grown fields about Hemet Lake. The middle of August they were conspicuously abundant on Thomas Mountain.

Though not encountered in the lower parts of the mountains proper, the species was noted, rather singularly, at one low zone station at the northern base of the range. In Banning (2300 feet) chipping sparrows were seen at various times during the second week in June, in orchards and gardens in the town, and it accord-

ingly seems possible that they were breeding there. The species is known to breed in similar situations in certain Upper Sonoran valleys west of the mountains.

Twenty-eight specimens were collected, as follows: Round Valley, one (no. 2200), Tahquitz Valley, two (nos. 2847, 2848), Strawberry Valley, nine (nos. 2666-2674), Fuller's Mill, three (nos. 1891-1893), Schain's Ranch, four (nos. 1908-1911), Hemet Lake, five (nos. 2966-2970), Thomas Mountain, one (no. 3030), Garnet Queen Mine, one (no. 2433), Toro Peak, two (nos. 2431, 2432).

One partial albino was secured: no. 2969, ♀ juv., Hemet Lake, August 14. It is in the juvenal plumage, but with the following areas pure white: rump, upper tail coverts and all but two of the rectrices, most of the primaries, and the primary coverts of each wing, almost the entire under surface of the body, and some feathers on the nape. Some of the dusky juvenal streakings are present on the sides of the breast.

***Spizella breweri* Cassin**

Brewer Sparrow

At the end of May and during June this species was fairly common in the sagebrush of Hemet Valley. It was observed by us at Thomas Valley, Kenworthy, and nearly to Vandeventer Flat, and was undoubtedly breeding throughout this region. At Cabezon, early in May, small flocks of Brewer sparrows were seen on several occasions, apparently migrating. They were found nesting nowhere on the desert slopes of the mountains. Fairly common in the chaparral at Vallevista, August 29 to September 5.

Five specimens were collected, two at Cabezon (nos. 1634, 1635), and three at Vallevista (nos. 3118-3120).

***Spizella atrogularis* (Cabanis)**

Black-chinned Sparrow

A common species on the northern and western slopes of the mountains, but not encountered at any point on the desert side.

They were particularly numerous in Hemet Valley, where the characteristic song of the male bird was to be heard on all sides, from Kenworthy to Vandeventer Flat, and beyond as far as Onstott Creek and the lower parts of Santa Rosa Mountain. As a rule they frequented the chaparral-covered hills, rather than the sage-brush of the valley, but were found in the latter also where the growth was particularly dense, as between Vandeventer Flat and Santa Rosa Mountain.

On the northern slopes of the range, in May and June, many were seen at Cabezon, Banning and Schain's Ranch; as small juvenals were taken they were evidently nesting at these points.

Two nests were found, one at Kenworthy, May 21, the other between Vandeventer Flat and Santa Rosa Mountain, June 25. The two, very similar in construction, were both in sagebrush about two feet from the ground, well concealed, and discovered only by the sudden flight of the female. The first contained four eggs, far incubated; the second, three eggs, one infertile, the others incubated. Of the first found, the nest and broken egg shells were saved (no. 78); the second nest was preserved with the eggs intact (no. 73). The shells of no. 78 are clear Nile blue without a trace of maculation; those of no. 73 are Nile blue with sparse dotting of sepia, cinnamon, and fawn color, these markings being agglomerated around the large ends of the eggs. The latter set measures in millimeters: 17.9 x 14.3, 17.8 x 14.2, 17.6 x 14.1.

The parent birds were extremely shy, the male singing at a safe distance, the female hovering about uttering excited "chips," but not permitting a near approach.

During May and June the male birds uttered their brief song at frequent intervals throughout the day. The song of the black-chinned sparrow is absolutely distinct from that of any other bird of southern California. A description may be attempted as follows: The male bird selects the tip of the tallest shrub in the chaparral in the vicinity of its nest. This perch is seldom more than six feet above the ground, usually on the rising slope above the nest. In one instance a singing bird was at the tip of a scrub oak at least fifteen feet above the ground; in another a male was observed at the extreme top of a dead pine, about

one hundred feet from the ground, where he sang for some time before descending to the brush beneath; but these are exceptional cases.

The song is a brief series of notes run together rapidly, the series repeated at irregular intervals, as often as fifteen seconds apart, but with occasional lapses of many minutes. All the notes of the series are on apparently nearly the same pitch. But the first three at least, which are uttered with relative deliberation and distinctness, are of rising inflection; the rest of the series are uttered so rapidly that individual intonation is lost. To describe the sequence in other words, the first note of the series receives most stress, the rest successively less stress until the last ones are scarcely distinguishable to the ear. The pitch is very high, wiry, but not loud or piercing. The general impression is of a weak song. It certainly does not carry far; on the contrary, a bird may be singing close at hand, and give the impression of great distance.

If comparisons be made, we should say that in length of song, and frequency of repetition, the black-chinned sparrow is like the Lazuli bunting; in sequence of notes, uniformity of pitch, and increasing rapidity of utterance it is like the wren-tit; in rising inflection of each of the first few notes of the series it is like the cañon wren; in high-pitched quality of tone and general weakness it resembles the western gnatcatcher. The song of the eastern field sparrow, according to memory, most nearly resembles that of the black-chinned sparrow.

Aside from the song of the male, the only other vocalization possessed by the black-chinned sparrow, is the chipping sparrow-like "chit" of both sexes, usually low but sharp, and as an expression of alarm, intensified.

The upward limit of the species in the San Jacinto Mountains during the breeding season appeared to be about 6000 feet, just at the lower edge of Transition. They were encountered at about this altitude at Fuller's Mill, and near Garnet Queen Mine. That this species evinces the tendency, common to many low zone birds, to invade higher altitudes in late summer, was demonstrated by the capture of an immature specimen in Tahquitz Valley, 8000 feet, on July 26.

Early in August they were fairly common at Hemet Lake. Here they frequented certain open, gravelly areas near the shores of the lake, where there was a thin growth of low weeds in which the birds fed in scattered flocks of eight or ten.

Twenty-six specimens were taken, from the following points: Cabezon, five adults (nos. 1636-1640), Hurley Flat, one (no. 1641), Schain's Ranch, one (no. 1865), Banning, two juvenals (nos. 2041, 2042), Kenworthy, five adults (nos. 2306, 2307, 2310-2312), Vandeventer Flat, one adult (no. 2308) and one juvenal (no. 2309), Tahquitz Valley, one immature (no. 2849), Hemet Lake, nine immatures (nos. 2957-2965). The Tahquitz Valley and Hemet Lake specimens are all in complete first winter plumage, no adults being secured after the post-nuptial molt. The female taken with the set of eggs near Vandeventer Flat (no. 2308) is distinctly marked with black on the chin, quite as conspicuously as many male birds.

***Junco oreganus thurberi* Anthony**

Sierra Junco

A common species in the higher parts of the mountains, from the lower edge of Transition upwards. The lowest point at which juncos were seen was Schain's Ranch (4900 feet). At Strawberry Valley, Tahquitz Valley, and Round Valley, and in the Santa Rosa Mountains, both at Garnet Queen Mine and on the ridge from Santa Rosa Peak to Toro Peak, they were numerous.

Two nests were found at Schain's Ranch, June 22. They were in like situations, on the ground, near small streams, and well hidden in the shrubbery. One contained two eggs and two newly hatched young, and the other held three incubated eggs. Another nest was discovered in Tahquitz Valley, July 21. This was placed in a depression in a bank, adjoining a little stream, and concealed by overhanging grasses and ferns. As large young were seen by the third week in June, it accordingly seems probable that a second brood is sometimes raised. On Thomas Mountain, August 16 to 20, they were gathered in relatively large flocks. Specimens taken at this time were well advanced in the annual molt.

Sixty specimens were preserved, as follows: Fuller's Mill, eight (nos. 1964-1971), Round Valley, fourteen (nos. 2086-2092, 2191-2195, 2206, 2207), Tahquitz Valley, twelve (nos. 2928, 2930-2940), Strawberry Valley, four (nos. 2646-2649), Garnet Queen Mine, eight (nos. 2383-2385, 2406-2410), Santa Rosa Peak, seven (nos. 2411-2415, 2426, 2430), Toro Peak, three (nos. 2427-2429), Thomas Mountain, four (nos. 3026-3029).

***Amphispiza bilineata deserticola* Ridgway**

Desert Black-throated Sparrow

A common species on the desert foothills; one of the few birds that is even fairly abundant on the hot, dry mesas forming its habitat. Seen scattered through the brush at Dos Palmos, and in Palm Cañon from the floor of the desert at the cañon mouth up to about 3000 feet. In San Geronimo Pass it was one of the characteristic birds at Whitewater, Snow Creek, Cabezon, and Banning.

A nest containing two eggs (no. 77) was found near the brink of Deep Cañon, June 1. It was in a little gully, about a quarter of a mile from water, and placed in a clump of *Dalea johnsonii*, about one foot from the ground. It was loosely fastened among the forking branches, being held in place more by the general thorniness of the shrub than by any evident forethought in its construction. The material of the nest is mostly gray, weathered grass, and some fine weed stems. The parent bird slipped quietly off the nest, flew to some distance, and did not return.

This may have been a second set, full-grown juvenals being seen on the same date. As young birds at about the same stage of development were secured in this locality late in the summer, August 23 to 27, the nesting season appears to be rather protracted. Adults taken during the last week in August had nearly finished the annual molt.

The species was encountered at one place west of the mountains, a single bird being seen at Vallevista, September 4.

Twenty-six specimens were preserved: Snow Creek, two (nos. 2070, 2166), Cabezon, seven (nos. 1628-1633, 2125), Banning,

two (nos. 2038, 2039), Dos Palmos, eleven (nos. 2516-2526), Palm Cañon, four (nos. 3042-3045).

***Amphispiza belli* (Cassin)**

Bell Sparrow

Fairly common, mostly in the sagebrush of the Upper Sonoran Zone. The species was first noted at an altitude of about 3000 feet as we entered the mountains from the west on the stage road following the course of the San Jacinto River. At Kenworthy, in May and June, it was noticeably abundant and undoubtedly breeding, though we found no nests. Here the birds frequented the denser growth of sagebrush on the floor of the valley. During the first week in June flocks of five or six individuals were occasionally encountered, possibly non-breeding birds, for the majority of the species were in pairs and scattered through the brush at fairly regular intervals. The birds forming flocks were silent, usually feeding on the ground, while of the paired birds the male spent a large portion of the time perched upon a projecting limb of a bush, and uttering his song at frequent intervals.

On the north side of the mountains Bell sparrows were fairly common in the greasewood of the foothills above Cabezon. In ascending the "Hall Grade" at this point, they were first seen at about 2000 feet, and from there on up to Hurley Flat. Also encountered during June at Banning and at Schain's Ranch.

In the late summer, juvenals were secured at much higher altitudes than those frequented during the nesting season: in Tahquitz Valley (8000 feet), July 25, 28, 29, and in Round Valley (9000 feet), August 2. Abundant at Hemet Lake during August, and at Vallevista, at the western base of the mountains, August 29 to September 5. At the latter point they were gathered in flocks.

Adults taken at Schain's Ranch the latter part of June are in the midst of the annual molt, while some collected at Hemet Lake, August 11, have nearly finished it. Full-grown juvenals were secured the last week in June, and others not yet molting from the juvenal plumage, as late as August 6.

Thirty-one specimens were collected: Hall Grade, two (nos. 1626, 1627), Schain's Ranch, six (nos. 1902-1907), Poppet Flat, one (no. 2010), Banning, one (no. 2040), Kenworthy, seven (nos. 2356-2362), Tahquitz Valley, six (nos. 2859-2864), Round Valley, one (no. 2865), Hemet Lake, five (nos. 2971-2975), Valle Vista, two (nos. 3116, 3117).

***Melospiza melodia cooperi* Ridgway**

San Diego Song Sparrow

Nowhere abundant, and yet represented in suitable places almost wherever such occur. Noted as follows: At Cabezon, May 20, one was seen in the cañon bottom near camp; at a cienaga at about 2000 feet altitude in Snow Creek Cañon, one was heard and seen repeatedly, May 28 and 31; near Banning, June 6, 8 and 14, single individuals were noted; several were heard or seen in ravines and meadows, and one (no. 1912) taken, at Schain's Ranch, 4900 feet, June 18; in the cañon of the San Jacinto River, near Oak Cliff, at 2000 feet altitude, one was heard, May 19; and in the lower Palm Cañon, 800 to 1200 feet altitude, several were observed, and two (nos. 3053, 3054) taken, June 15 and 16. It is probable that the species was breeding at all these places.

The song sparrows in this region appeared to be restricted to Riparian or almost Palustrine associations, below the Transition zone; this accords with the occurrence of the race *cooperi* elsewhere in southern California. The thing of startling interest was its occurrence in the cañons on the desert base of the mountains, without departing in its subspecific characters from the average of *cooperi* as occurring throughout the San Diegan district. The two specimens from Palm Cañon are adults, in very good plumage for comparative purposes. They do not differ in appreciable degree from *cooperi* from the Pacific slope of southern California; in other words they show no perceptible approach towards the very different *M. m. saltonis* of the Colorado desert around Mecca, at the northwest end of Salton Sea.

This is significant when it is considered that conditions of flora, temperature, and humidity, are to all appearances very

similar in lower Palm Cañon to what they are at Mecca; at least is this true of those conditions immediately surrounding the song sparrow. In Palm Cañon, just the same as at Mecca, the plants foraged through are arrow-weed, mesquite, and small areas of wire grass.

It is probable that song sparrows in Palm Cañon have been there for at least several generations, for the senior author collected a specimen typical of *cooperi* there December 28, 1903. It would therefore appear that the supposedly "susceptible" song sparrow (at any rate in this race) is in reality not subject to quick modification of characters in the lifetime of the individual, or through several successive generations.

It is patent from geographic contiguity, as well as characters, that the colonies inhabiting Palm Cañon and others of the cañons of the desert drainage of the San Jacintos, were originally stocked from the Pacific side. The elapsed time has not been sufficient for the impress by the new and strange environment of modifications to a perceptible degree.

It would appear that here, under perfectly natural conditions, we have an experiment of just the sort demanded by experimentalists to prove whether or not subspecific differences are subject to abrupt modification by changed environment. In this case the characters are much more stable than has been supposed (see Beebe, 1907).

Melospiza lincolni lincolni (Audubon)

Lincoln Sparrow

Found only in the Boreal meadows of Tahquitz Valley and Round Valley. Here during July we found them in fair abundance in the wet, veratrum-covered cienagas, though the birds were inconspicuous, and not readily seen. A large proportion of the specimens secured were caught in mouse traps set for meadow mice and shrews. Early in July, at the time of our arrival at the points where the species was encountered, the young were already out and flying about.

Twenty-two specimens were preserved, twelve adults and ten juvenals, nine from Round Valley (nos. 2097-2102, 2197-2199), and thirteen from Tahquitz Valley (nos. 2916-2928).

***Passerella iliaca stephensi* Anthony**

Stephens Fox Sparrow

Abundant in a comparatively limited area at high elevations. We found it in numbers in Tahquitz Valley, 8000 feet, and in Round Valley, 9000 feet, and a few were noted at a point on the North Fork of the San Jacinto River, near Fuller's Mill, at altitudes varying from 6000 to 7500 feet. This was the lowest point of record in the San Jacintos; we found it nowhere else below 8000 feet. As in the San Bernardino Mountains (see Grinnell, 1908, p. 99), we found the distribution of the species in the San Jacintos to be nearly coextensive with that of the chinquapin (*Castanopsis sempervirens*), the only place where the birds were in different surroundings being near Fuller's Mill. In the higher parts of Santa Rosa Mountain, where the fox sparrows might reasonably be expected to occur, there was no chinquapin, and none of the birds.

By the time we had reached the high altitudes frequented by the species, early in July, the young were out and flying about.

Twenty-seven specimens were collected: Fuller's Mill, two (nos. 2006, 2009), Deer Spring (near Fuller's Mill), two (nos. 2007, 2238), Round Valley, four (nos. 2096, 2212-2214), Tahquitz Valley, nineteen (nos. 2876-2894).

***Passerella iliaca schistacea* Baird**

Slate-colored Fox Sparrow

A sparrow (no. 2008) unequivocally referable to this form was secured at Deer Springs (7500 feet), near Fuller's Mill, on July 3. It has apparently just concluded the molt, with the plumage fresh and glossy, and in striking contrast to the worn, faded condition of the breeding examples of *stephensi* taken at the same time.

The occurrence here of an individual of this subspecies early in July is extraordinary, and the added fact of the unusual plumage condition emphasizes the abnormality of the specimen. Two possibilities present themselves: first, that it had, perhaps, finished breeding and the subsequent change of plumage at an unusually early date, then migrated southward to where it was

taken; second, that through a crippled condition this bird had not been able to travel back north to the regular summer habitat of the subspecies. No indication of injury was in evidence, however.

Whatever the explanation the bird is a perfectly typical example of *P. i. schistacea*, as determined by comparison with extensive series of this form. The normal range of *schistacea* finds its southern limit in the White Mountains, Mono County, California, about 250 miles north of San Jacinto Peak, while another race, *megarhyncha*, occurs in parts of the intervening region.

***Pipilo maculatus megalonyx* Baird**

Spurred Towhee

An abundant and characteristic species in the chaparral of the Upper Sonoran zone, particularly numerous about Kenworthy, and eastward to Vandeventer Flat. A few observed along the stream at Dos Palmos late in May, probably wanderers from the adjacent hills, attracted by the water, as was the case with several other Upper Sonoran species at this point. On the northern slopes of the range the spurred towhee was found ranging downward as far as the abrupt base of the mountains in the San Geronimo Pass, at Cabezon and Banning, but not out upon the floor of this valley.

On June 11 two nests were found at Oak Tree Spring, between Kenworthy and Palm Cañon. Both were placed in the usual situation, on the ground under over-hanging bushes, and each contained three eggs. A nest with three eggs (no. 61) was taken at Cabezon, May 10, in a very similar situation.

At the time we reached the highest parts of the mountains, the late summer dispersal of birds was well under way, and the spurred towhees had ascended to points probably far above the normal breeding range. Full-grown juvenals were secured near the summit of Toro Peak (8000 feet), July 1, and at Round Valley (9000 feet), July 10.

Twenty-eight specimens were preserved, from the following localities: Cabezon, one (no. 1609), Schain's Ranch, sixteen (nos.

1826-1841), Fuller's Mill, one (no. 1901), Round Valley, one (no. 2211), Strawberry Valley, three (nos. 2613-2615), Kenworthy, two (nos. 2351, 2352), Garnet Queen Mine, two (nos. 2471, 2472), Toro Peak, one (no. 2473), Hemet Lake, one (no. 2976).

***Pipilo crissalis senicula* Anthony**

Anthony Towhee

A common species from the base of the mountains upward through the Upper Sonoran zone. On the western slopes it was one of the commoner birds from Hemet and Vallevista up into Hemet Valley to the vicinity of Kenworthy and Vandeventer Flat. In San Gorgonio Pass it was found in abundance along the foothills at Snow Creek, Cabezon and Banning. On the desert side a number were seen along Carrizo Creek, near Dos Palmos, and in Palm Cañon to its very mouth. The highest point of record was the vicinity of Schain's Ranch, 4900 feet.

Twenty-eight specimens were preserved: Cabezon, eleven (nos. 1662-1671, 1775), Schain's Ranch, three (nos. 1922, 1923, 1925), Poppet Flat, one (no. 1924), Banning, three (nos. 2033-2035), Snow Creek, two (nos. 2066, 2170), Kenworthy, two (nos. 2353, 2354), Dos Palmos, one (no. 2479), mouth of Palm Cañon, one (no. 3052), Hemet Lake, one (no. 2977), Vallevista, three (nos. 3110-3112).

***Oreospiza chlorura* (Audubon)**

Green-tailed Towhee

A common species over practically the same general territory as that occupied by the Stephens fox sparrow, and frequenting the same sort of ground. Abundant in Tahquitz Valley and in Round Valley, while a few were seen in Strawberry Valley and at Fuller's Mill. As was the case with the fox sparrow, the green-tailed towhee was not found on Santa Rosa Mountain. A migrant was taken at the base of the mountains near Cabezon, May 13. The rest of the specimens secured were taken on dates ranging from July 1 to August 4, and a large proportion of them are young birds, some in full juvenile plumage, and others

variously advanced in the post-juvenal molt. An immature female secured August 2 (no. 2873) has already acquired complete first winter plumage.

Thirty-five specimens were collected: Cabezon, one (no. 1625), Fuller's Mill, three (nos. 1898-1900), San Jacinto Peak, one (no. 2093), Round Valley, five (nos. 2094, 2095, 2208-2210), Tahquitz Valley, twenty-three (nos. 2873, 2874, 2895-2915), Strawberry Valley, two (nos. 2643, 2644).

***Zamelodia melanocephala capitalis* (Baird)**

Pacific Black-headed Grosbeak

A common species, except in the highest parts of the range. At Cabezon they were abundant early in May, but apparently did not remain to breed in this region, for by the end of the month the birds had nearly all departed. They were fairly common at Schain's Ranch and Fuller's Mill. In Strawberry Valley during July they were numerous. A few were seen in Tahquitz Valley, wanderers from lower zones, as were probably others observed on Santa Rosa Peak. Several seen on Thomas Mountain, August 16 to 21.

Twenty-six specimens secured: Cabezon, four (nos. 1613-1616); Schain's Ranch, seven (nos. 1792-1798); Poppet Flat, one (no. 1889); Banning, one (no. 2031); Snow Creek, two (nos. 2060, 2061); Santa Rosa Peak, one (no. 2476); Strawberry Valley, six (nos. 2607-2612); Tahquitz Valley, one (no. 2850); Hemet Lake, three (nos. 2980-2982).

Comparison of California specimens of the black-headed grosbeak with a satisfactory series of breeding birds from south-eastern Arizona, reveals differences justifying the separate naming of the two races. The California birds, compared with true *melanocephala* of the Rocky Mountain region, have uniformly shorter wing length, smaller bills, and the black of the head invariably interrupted by a more or less distinct post-ocular stripe. The presence of these differences is, of course, no new discovery (see Ridgway, 1901, 618, 619; Grinnell, 1900, 128), but though long acknowledged to exist, the two forms have not

usually been accorded separate names. There seems, however, to be abundant justification for so doing, and Baird's name *capitalis* (1874, p. 70) is available for the California bird.

***Guiraca caerulea salicaria* Grinnell**

California Blue Grosbeak

Seen early in May in some numbers, evidently migrating, at Cabezon, and in the nearby hills at Hurley Flat (3500 feet). One noted at Whitewater, May 26. Birds observed in pairs about Banning the middle of June, were probably nesting nearby. An adult female taken at Hemet Lake, August 10, was the only one of the species encountered so far back in the mountains.

Five specimens were taken: Cabezon, three (nos. 1610-1612), Banning, one (no. 2032), and Hemet Lake, one (no. 2979).

***Passerina amoena* (Say)**

Lazuli Bunting

Fairly common at a few localities in the high mountains, as at Schain's Ranch and Strawberry Valley. After the nesting season stragglers were taken, one at Tahquitz Valley, August 4, another at Carrizo Creek, on the desert side of the mountains, August 26. A nest containing three incubated eggs (no. 79) was found at Strawberry Valley, July 7. It was placed about two feet above the ground in a tangle of rose bushes overhanging a little creek.

Ten specimens were collected: Schain's Ranch, four (nos. 1811-1814), Strawberry Valley, four (nos. 2652-2655), Tahquitz Valley, one (no. 2872), and Carrizo Creek, one (no. 2536).

***Piranga ludoviciana* (Wilson)**

Western Tanager

A fairly common species in the Transition zone. Migrating in some numbers at Hemet, May 19, and at Cabezon during the first two weeks in May. Breeding at Strawberry Valley, where a small juvenal was secured July 8. One or two seen at Garnet

Queen Mine the end of June, an adult male, a straggler, at Tahquitz Valley, July 25, and a number of migrants at Hemet Lake, August 5 to 14, and on Thomas Mountain, August 16 to 21. An adult male was taken on the desert side at Carrizo Creek, August 26, the only one seen at this point. It was still in the summer plumage, having not yet begun to molt.

Six specimens were taken: Strawberry Valley, four (nos. 2627-2630), Hemet Lake, one (no. 2978), Carrizo Creek, one (no. 2480).

***Progne subis hesperia* Brewster**

Western Martin

Abundant in Hemet Valley, where they were breeding in the clumps of yellow pines scattered over the floor of the valley. Especially numerous in the vicinity of Kenworthy. The highest record station in the mountains was Fuller's Mill, 5900 feet, where the birds were fairly common. At Hemet Lake, early in August, many appeared daily, circling about over the surface of the lake.

Thirteen specimens were taken, all adults: Fuller's Mill, three (nos. 1874-1876), Kenworthy, nine (nos. 2333-2341), Hemet Lake, one (no. 2996). The Hemet Lake specimen taken August 11, is just beginning the annual molt.

***Petrochelidon lunifrons lunifrons* (Say)**

Cliff Swallow

Abundant and breeding at many points in the lower parts of the mountains. Large colonies were seen, at that time building nests, in a barn in the town of Hemet, May 18, on a cliff alongside the San Jacinto River road, at about 2000 feet, May 19, and in a deserted mine building at Kenworthy, at the end of May. Many were seen June 13 flying about a rocky gorge in Palm Cañon, at about 3000 feet, where they were probably nesting, and a few on the following day at the mouth of the cañon. Found breeding at Cabezon in May, and at Banning in June. Common at Hemet Lake, August 5 to 14, a large proportion of those seen being young of the year.

Twelve specimens were taken: Cabezon, two (nos. 1714, 1715), Kenworthy, eight (nos. 2325-2332), Hemet Lake, two (nos. 2997, 2998).

***Hirundo erythrogastra palmeri* Grinnell**

Western Barn Swallow

A single bird noted at Deep Cañon, May 31, apparently migrating. At Valle Vista, during the first week in September, several were seen passing overhead. One specimen, an immature female (no. 3125), was taken at the latter point.

***Tachycineta thalassina lepida* Mearns**

Northern Violet-green Swallow

An abundant species from about 4500 feet upwards. Seen in some numbers at Kenworthy, where they were nesting in the big pines in the valley. Encountered on Santa Rosa Mountain, from Garnet Queen Mine up to Santa Rosa and Toro peaks. At all the other points visited from Transition upwards, it was one of the commoner species. By the third week in July young birds began to appear on the wing, and in Tahquitz Valley at this time were in large flocks hovering about the meadows. Several violet-green swallows were seen at the summit of San Jacinto Peak, July 27. Sixteen specimens were preserved: Fuller's Mill, six (nos. 1877-1882), Toro Peak, one (no. 2436), Santa Rosa Peak, one (no. 2437), Strawberry Valley, one (no. 2645), Tahquitz Valley, seven (nos. 2749-2755).

***Riparia riparia* (Linnaeus)**

Bank Swallow

Seen at but one point, Hemet Lake, August 5 to 15, during which time several birds were observed. These were probably migrants through the region.

***Stelgidopteryx serripennis* (Audubon)**

Rough-winged Swallow

A flock of about fifteen individuals, supposed to be of this species, seen at Schain's Ranch on June 26. At Hemet Lake, August 5 to 15, migrating rough-winged swallows were noted on several occasions.

***Bombycilla cedrorum* Vieillot**

Cedar Waxwing

A flock of at least fifty seen in pepper trees bordering a street in the town of Hemet on the morning of May 19. The capture of a full-grown juvenal (no. 3001), at Hemet Lake, the morning of August 9, was an unexpected occurrence, difficult of explanation. This bird appeared immediately after an exceptionally heavy storm, and was the only one of the species observed anywhere in the mountains. The capture of this specimen is not in itself evidence of the breeding of the species in the region, for though in the streaked juvenal plumage it was as strong on the wing as any adult, and hence capable of travelling a long distance.

On the other hand, to assume that it had traveled as far as the distance from the nearest known breeding station of the species, northern Oregon, does not seem altogether warranted. It appears more reasonable to believe that the cedar waxwing will eventually be found to breed occasionally in parts of California, though at present not known to do so.

***Phainopepla nitens* (Swainson)**

Phainopepla

Encountered in numbers at various points in San Geronio Pass. At Cabezon, during May, they were seen daily, usually in small flocks, and evidently migrating. Also observed at Snow Creek, the end of May, and at Banning, early in June. At the latter point they were probably breeding. The few birds noted at Dos Palmos Spring the last week in May, and at Piñon Flat, June 2, were probably transients, as none were seen at these

points upon subsequent visits late in the summer. A very few were noted in the lower parts of Palm Cañon, one being taken in the cañon at an altitude of about 3000 feet. Seen in numbers at Vandevanter Flat, August 27.

Four specimens were preserved: Cabezon, two (nos. 1724, 1725), Snow Creek, one (no. 2065), Palm Cañon, one (no. 3081).

***Lanius ludovicianus gambeli* Ridgway**

California Shrike

Shrikes do not occur numerously anywhere in the mountains proper, though they are fairly common in the valleys east and north of the range. In San Geronimo Pass they were moderately abundant eastward as far as Cabezon, and decidedly scarce in the desert region beyond. In the vicinity of Dos Palmos and Deep Cañon single birds were several times seen in June and August.

On May 19 a nest was found in Thomas Valley, 4400 feet altitude, not far from the head of Hemet Lake. It contained six eggs, too far advanced in incubation to be saved.

Eight specimens were preserved, as follows: Snow Creek, one (no. 2059), Banning, two (nos. 2026, 2027), Dos Palmos, two (nos. 2477, 2478), Thomas Valley, one (no. 2301), Hemet Lake, two (nos. 2994, 2995).

***Vireosylva gilva swainsoni* (Baird)**

Western Warbling Vireo

Found breeding at several points in high Upper Sonoran or Transition. A nest was discovered at Garnet Queen Mine, June 27, and at Schain's Ranch, June 21, and many of the birds were seen at Fuller's Mill and Strawberry Valley. Migrants were passing through at Cabezon early in May, and at Dos Palmos during the last week in the month. By July 24 they appeared in Tahquitz Valley, beginning to scatter after the nesting period.

Fourteen specimens were taken: Cabezon, one (no. 1741), Snow Creek, one (no. 2158), Schain's Ranch, one (no. 1808), Fuller's Mill, one (no. 2015), Strawberry Valley, four (nos.

2714-2717), Tahquitz Valley, two (nos. 2786, 2787), Vandeventer Flat, two (nos. 2304, 2305), Garnet Queen Mine, one (no. 2445), Dos Palmos, one (no. 2542).

***Lanivireo solitarius cassini* (Xantus)**

Cassin Vireo

Found in fair abundance in such portions of the Transition zone as were visited by our parties. Many were seen at Garnet Queen Mine, the last week in June, and in Strawberry Valley, during July; immature birds appeared in numbers in Tahquitz Valley the latter half of July. Other points of record were Keen's Camp and Schain's Ranch during June. A small juvenal, but recently from the nest, was taken at Garnet Queen Mine, June 26.

Seventeen specimens were collected: Schain's Ranch, two (nos. 1809, 1810), Strawberry Valley, four (nos. 2718-2721), Tahquitz Valley, six (nos. 2780-2785), and Garnet Queen Mine, five (nos. 2446-2450).

***Vireo huttoni huttoni* Cassin**

Hutton Vireo

Encountered at just one point in the region explored, at Garnet Queen Mine, Santa Rosa Mountains, altitude 6000 feet. Here, in high Upper Sonoran, the species was fairly abundant. Five specimens were taken (nos. 2401-2405), three adults in worn plumage and two full-grown juvenals.

***Vireo belli pusillus* Coues**

Least Vireo

An abundant species in suitable portions of the Lower Sonoran zone along the streams in the lower parts of the cañons, where there was sufficient vegetation for shelter. In lower Palm Cañon, the middle of June, they were particularly numerous, from its mouth up to Little Paradise Valley, altitude about 3000 feet. At the mouths of Palm and Murray cañons the least vireos frequented the dense thickets of mesquite and arrowweed. In Little Paradise Valley and at one or two other points in the cañon,

extensive areas grown up with willow and guatemote (*Baccharis glutinosa*) formed their habitat. They were also common along the north base of the mountain, at Snow Creek, Cabezon and Banning, but only at the mouths of the cañons. Found but once on the west slope of the range, along the San Jacinto River road at 2000 feet, where several were seen or heard singing on May 19.

A nest was found at the cañon mouth near Cabezon, which, on May 20, contained three newly hatched young.

Ten specimens of the least vireo were preserved: Cabezon, three (nos. 1738-1740), Palm Cañon, seven (nos. 3069-3075).

Vireo vicinior Coues

Gray Vireo

This was probably the most important single species of bird discovered in the San Jacinto region, because previously little known as a bird of California. This vireo proved to be numerous in a very definite division of the Upper Sonoran zone chiefly on the Pacific side of the mountains. The distribution of *Vireo vicinior* is capable of more exact definition than is usually the case with birds. It is, namely: the *Adenostoma minor* association, of the Chaparral major association, of the San Diegan faunal division, of the Upper Sonoran zone.

To recount in detail the localities of occurrence: we first met with the species as we entered the region May 19, on the road up San Jacinto cañon, at about 3000 feet altitude. With little doubt a pair were nesting at this point. This was the westernmost record station. On the brushy slopes below Strawberry Valley towards Hemet Valley, 4500 to 5000 feet, and on the opposite lower slopes of Thomas Mountain at about the same altitudes, the presence of the species was repeatedly detected. In the vicinity of Kenworthy, chiefly to the northeast, from 4500 to fully 6500 feet altitude, up over the Hemet Peak ridge, and thence down to the 3000 foot contour towards the head of Palm Cañon, the gray vireo was perhaps fully as conspicuous a member of the Chaparral association as the western gnatcatcher or black-chinned sparrow.

Crossing Palm Cañon, one individual was noted on a ridge at 4200 feet near Potrero Spring and north of Asbestos Moun-

tain, June 13, this being the northernmost station of observation. Along the trail from Vandeventer Flat to Piñon Flat many were noted as far east as Omstott Creek, 4500 feet to 3000 feet, this being also about the limit in that direction of either species of *Adenostoma*. One bird was heard June 23 among the piñons on Piñon Flat, half a mile east of Omstott Creek. Several individuals were noted on a brushy ridge near Garnet Queen Mine at about 6000 feet altitude, this being the most southeastern point of observation.

As already intimated, this vireo is pre-eminently an inhabitant of dry chaparral, thus conflicting in range with no other species of the genus. Along the road below Strawberry Valley, towards Keen's Camp, both this and the western warbling and Cassin vireos were heard simultaneously. The notes of the latter two, however, resounded respectively from the alder-lined ravine bottoms, and from the golden or black oaks of the cool slopes, while the gray vireo sang from the chamissal on the hot, steep slopes near Chalk Hill. At Garnet Queen Mine, both the Hutton and gray vireos were heard from the same stand, the former, however, from the golden oaks, the latter, as usual, from the brush belt adjacent. In upper Palm Cañon, both the gray and the least vireos were noted in one short stretch, the former in some chamissal straggling down the west wall to the lowest limit of its range, the latter species in some guatemote and chilopsis along the stream bed. The presence of no less than five closely related species of one family in so limited a region is obviously closely dependent upon the separate, sharp, associational and zonal preferences of each. The warbling, Cassin and Hutton vireos are arboreal foragers; the least and gray vireos brush foragers; but the least is riparian, while the gray is distinctly a dry-slope forager. We may surmise that the latter species has only been able to find its way into the avifauna of southern California from a Sonoran center of dispersal, through the existence of an associational niche not occupied by another vireo.

It was in the vicinity of Kenworthy that most of our study of the gray vireo was carried on. Here the bird was a constant accompaniment of the belts of the two species of chaparral bushes, *Adenostoma sparsifolium* and *A. fasciculatum*. While

adhering closely to the cover of these plants, it foraged also through scrub oak, manzanita, and ceanothus, occasionally into four-leafed piñon (*Pinus parryana*) or sagebrush (*Artemisia tridentata*). The forage depth of this vireo is between one and five feet above the ground, rarely any higher. A person may follow a bird around for twenty minutes, keeping track of it by the oft-repeated song, without catching a view of it above the level of the chaparral tops.

We estimated that there was a pair of gray vireos for every forty acres of suitable ground, thus giving an unusually large forage area for the individuals of this species. The impression was sometimes given that the population was much more dense, but we decided that the far-carrying song tended to mislead in this regard. Taking the above estimate as conservative, there would be 16 pairs to the square mile. We are of the opinion that there are about thirty square miles of the appropriate association in the San Jacinto region; so that the total number of individuals of this rare bird in the region under treatment was, in 1908, before the advent of the new broods, close to 960.

As already to be inferred, the presence of the gray vireo is most easily ascertainable through the peculiar and far-reaching song. The birds themselves are very difficult to locate, except by means of this song. The truth of this statement will be perceived when it is further stated that after the close of the regular song season, when much of the same ground was repeatedly gone over by members of our parties, between August 5 and 27, but one bird was seen. Only once was the song heard during August, on the 16th, on the trail up Thomas Mountain from Hemet Lake. During the last of May, and June, the song was omnipresent in appropriate localities, from 5:15 A.M. in one case (May 21), to sundown. There seemed to be no cessation during midday.

The song of the gray vireo is loud and full-toned, in volume and quality. In these respects it reminds the hearer strongly of the Cassin vireo, yet with the twang and less deliberate utterance of a western tanager. In measure, and in the suggestion of alternate rising and falling inflection, it recalls the least vireo. No note at all was heard, besides this song, which was apparently

given only by the male. But it is, of course, probable that some sort of a location note, or food call in the case of the young, is possessed by this vireo, as with all other species of the family known to us.

Two nests were found in the vicinity of Kenworthy, both on May 21, each with three eggs, in one case moderately incubated, in the other fresh. The field note account of the discovery of the first nest gives inferential clue to some of the traits of this vireo. After having followed up several singing birds without success, a particular individual was located by its song on a sparsely brushed hillside which gave promise of less difficulty than usual in catching sight of the bird itself. "The song led me up into the brush, and then stopped. After waiting some time, it began again volubly, and I got a glimpse of a vireo as it left a brush-clump and went off up the hillside through the bushes, singing the while. Search disclosed a nest in the upper tangle of a greasewood (*Adenostoma fasciculatum*), with the female bird sitting closely thereon." Three photographs were secured of the nest, and one of the hillside. "The nest was 33 inches (about 850 mm.) above the ground, here sloping, and was discernible for several yards, though well surrounded by the sparsely-leaved greasewood twigs. Many of the latter had to be snapped off in order to obtain uninterrupted view of the nest (see pl. 10, fig. 2). During all this commotion the bird only sat the closer, winking often and occasionally turning her head or twitching her wings. I touched her bill and head several times, and finally picked her bodily from the nest. Meanwhile the male remained at a distance, showing very little concern." It will be observed that the general sequence of incidents is similar to that in one's experience with other species of vireos.

The second nest was found under much the same circumstances. It also was built in a greasewood bush, 36 inches above the ground. The female was sitting, but was not so persistent in remaining as the other, probably due to the shorter proportion of the incubation period so far completed.

Both nests, with their complements of eggs, are preserved in the Museum (sets nos. 74, 75). They are similar to other vireo's nests in shape and semi-pensile attachment. The main

support is at the rims, but their situation among the close-set, obliquely upright, stiffish stems of the greasewood afforded some support by minor twigs (see pl. 10, fig. 2). The measurements of the nests are, respectively, of each of the two nests in each respect: outside diameter, about 76, 73 mm.; inside diameter, 48, 47; outside depth, 54, 59; inside depth, 41, 43. The nests are composed largely of silvery gray weathered grass and plant fibers, usually with the vascular bundles unraveled. Some of these elements were evidently grass blades, some stems of plants, and others the shredded bark of weed-stalks. There is an admixture of tenaceous spider-web, and portions of spider cocoons; on the very outside, in both cases, are many unbroken, tridentate, gray leaves of the sagebrush. Internally the nests are lined with a distinct layer of slender, disintegrated, hair-like fibers of great length, so that the inner surfaces of the nests are firm and smooth, but porous.

The eggs are pure white in color, with numerous abruptly-defined minute dots and spots of not more than one-half millimeter diameter, nearly all agglomerated around the large ends. In color these markings are mostly very dark, of clove brown and sepia tones; a few approach drab. The eggs measure: no. 74: 18.3 x 14.5, 18.7 x 14.0, 18.8 x 14.1; no. 75: 17.8 x 14.7, 17.8 x 14.6, 18.2 x 14.7.

We obtained seventeen specimens of the gray vireo in the San Jacinto region, nos. 2313-2324, 2510, 2511, 3066-3068. All are adults, and all but two (taken with the sets) are males. There are five other skins of adults in the Museum (nos. 3631-3635) collected by F. Stephens, May 13 to 18, 1908, near Campo, San Diego County. One of these is a female, the rest males. With the above unprecedented amount of material at command, it becomes expedient for us to look into the characters of the species, geographical and seasonal. This is especially desirable since a name, *californicus*, has been applied to the California bird as separate from that of Arizona, whence *vicinior* was originally described.

A series of ten specimens was loaned us by the authorities of the United States National Museum; these are from Arizona, New Mexico and Lower California, and include Cones' type, from

Fort Whipple, Arizona. Mr. Frank Stephens kindly loaned several specimens in his private collection, from southern California.

Comparison of the California material with that from Arizona and elsewhere gives at first-glance an impression of color difference. Our San Jacinto series looks clearer gray above and purer white below. But close examination convinces us that the faint dull yellowish suffusion in the National Museum skins is adventitious, due to repeated handling, or to local, natural but extraneous, causes previous to capture. Some old skins in Mr. Stephens's collection from San Diego County, California, present precisely the same appearance. Coues' type of *vicinior* is wonderfully like no. 4465 of the Stephens collection, from Oak Grove, San Diego County. In fact, not the slightest difference in any respect is appreciable, save that the latter is if anything slightly more soiled. Coues's type resembles also no. 2318, Mus. Vert. Zool., but the latter is cleaner white below. There does not appear to be the slightest difference in either proportions or general size; and the range of individual variation is small.

It thus appears that there are no grounds for the systematic separation of the California birds from those of Arizona. This is in accord with the conclusions of Ridgway (1904, p. 203) from the "few specimens" at his disposal. In justice to the proposer of the name *californicus* (Stephens, 1890, p. 159), it should be stated that the material available to him at that time was extremely meager; and there certainly are very good geographic grounds to back up any differential peculiarities that might be shown by specimens. From a consideration of its distribution as now known, it appears probable that the gray vireo has invaded California from the south-central plateau region of western North America, within relatively recent times.

Our California series of *Virco vicinior* contains none in juvenal plumage; all are in more or less worn breeding plumage, except one. This is an adult male, no. 2316, secured at Vandeventer Flat, August 27, and is in nearly full fresh fall plumage. The annual molt is very nearly completed, only the outermost primaries being still partly unsheathed. Since there is in all probability no spring molt, even partial, this bird presents the

true color characters of the species. As compared with the better known spring plumage, conspicuous among various species of the family for its general plumbeous tone, the freshly acquired plumage is not so distinctly gray save about the head. The whole dorsum, the outer surface of closed wing, and, more appreciably, the rump and upper tail coverts, are pervaded with a tinge of green; the sides and flanks have a conspicuous tinge or mixture of primrose yellow; and there is a faint buffy suffusion across the chest. All these tints are evidently very much reduced, or obliterated altogether, through the intervening months of wear and fading, until spring brings the notable gray cast again.

As far as the records of the species in California show, the gray vireo is only a summer visitant north of the Mexican boundary. It is possible that the apparent scarcity of the gray vireo in the San Jacinto region in August was due in part at least to the early departure of individuals, which had thus already inaugurated the autumnal migratory movement.

***Vermivora rubricapilla gutturalis* (Ridgway)**

Calaveras Warbler

Observed only during the migration in the spring, and at but one locality. Two were seen at Cabezón, May 7, and one of them, an adult female, secured (no. 1769). On May 15 a single bird was noted at the same place.

***Vermivora celata lutescens* (Ridgway)**

Lutescent Warbler

Observed nowhere under circumstances indicative of the breeding of the species in the region explored. In fact, except for a single migrant observed at Cabezón, May 3, none was seen until after the termination of the nesting season. About July 20 they began to appear in Tahquitz Valley, and during the last week of the month were exceedingly abundant there. They were fairly common on Thomas Mountain, August 16 to 21.

Fifteen specimens were collected: Tahquitz Valley, fourteen (nos. 2805, 2815-2827), and Thomas Mountain, one (no. 3035).

The Tahquitz Valley birds are all immature, one or two in juvenal plumage, and one or two in fully acquired first winter plumage, but most of them in the midst of the post-juvenal molt. The Thomas Mountain specimen, collected August 17, is an adult female in fresh winter plumage.

***Dendroica aestiva rubiginosa* (Pallas)**

Alaska Yellow Warbler

In the vicinity of Dos Palmos, May 26 to June 2, migrating yellow warblers were seen daily, usually flitting hastily along through the line of vegetation bordering the creek. Three secured, a male and two females (nos. 2539-2541), proved to belong to this northern subspecies. It seems probable that all of these late migrants were of this form, as at this time the breeding yellow warbler of southern California has already begun nesting.

***Dendroica aestiva brewsteri* Grinnell**

California Yellow Warbler

The vicinity of Cabezon, at the northern base of the mountains, was the only place where yellow warblers were observed in any numbers. They were abundant here during May, and nesting in the neighborhood, as some were noted carrying nest material. But few were seen elsewhere in the mountains. Some were noted at Keen's Camp, July 5, apparently their eastward breeding limit in Hemet Valley, as the species was not encountered at Kenworthy. There were a few in the trees along the streams in Strawberry Valley, where they could be heard singing, though seldom seen.

Other points of record were Snow Creek, Banning, and Fuller's Mill in June, and a few migrants at Tahquitz Valley, July 25 and 28, at Hemet Lake, August 5 to 14, and at Dos Palmos, August 25 and 26.

Fifteen specimens were preserved: Cabezon, nine (nos. 1747-1753, 2126, 2127), Snow Creek, one (no. 2156), Strawberry Valley, two (nos. 2604, 2605), Tahquitz Valley, one (no. 2804), and Dos Palmos, two (nos. 2537, 2538).

Dendroica auduboni auduboni (Townsend)

Audubon Warbler

Seen migrating at Cabezon, at the north base of the mountains, during the first two weeks in May. Later in the summer found breeding numerous in the Transition zone and upwards. Exceedingly abundant in Round Valley, Tahquitz Valley and Strawberry Valley, and downward to a point a little above Schain's Ranch, about 5000 feet altitude. The species was present in the higher parts of the Santa Rosa Mountains, on Santa Rosa and Toro peaks, but not numerous, not more than twelve or fifteen of the birds being seen during a period of several days.

Young birds began to appear in July, and specimens collected during the third week in July were well advanced in the post-juvenal molt. An adult male was taken July 16 in which the annual molt had already begun, apparently about ten days in advance of the majority of the species, as represented by our series.

Thirty-eight specimens were collected, as follows: Cabezon, one (no. 1768), Fuller's Mill, three (nos. 1986-1988), Strawberry Valley, nine (nos. 2617-2625), Tahquitz Valley, thirteen (nos. 2735-2738, 2740-2745, 2766-2768), Round Valley, ten (nos. 2111-2114, 2232-2236, 2739), Toro Peak, one (no. 2458), Santa Rosa Peak, one (no. 2459).

Dendroica nigrescens (Townsend)

Black-throated Gray Warbler

Common in high Upper Sonoran, and in Transition. Here, as elsewhere in the mountains of southern California, closely associated with the golden oak during the nesting period. Abundant at Garnet Queen Mine, June 25 to July 2, full-grown young molting into first winter plumage being secured, and a female seen carrying nesting material at about the same date. A few seen from time to time in the brushy hills above Kenworthy. Numerous and breeding at Fuller's Mill and in Strawberry Valley. They began to appear in Tahquitz Valley the third week

in July, moving upward from lower altitudes. Small juvenals, evidently just from the nest, were taken at Garnet Queen Mine, June 26, and in Strawberry Valley, July 14.

Twenty-three specimens were preserved: Kenworthy, one (no. 2343), Hemet Peak, one (no. 2344), Fuller's Mill, one (no. 1989), Strawberry Valley, eight (nos. 2706-2713), Tahquitz Valley, two (nos. 2757, 2758), Hemet Lake, two (nos. 2999, 3000), Thomas Mountain, one (no. 3033), Garnet Queen Mine, five (nos. 2451-2455), Santa Rosa Peak, two (nos. 2456, 2457).

Dendroica townsendi (Townsend)

Townsend Warbler

Met with but once during the season, an adult female (no. 2342), a migrant, taken at Kenworthy, May 24.

Dendroica occidentalis (Townsend)

Hermit Warbler

Seen but once, an immature male (no. 3034), taken on Thomas Mountain, August 19. Undoubtedly a migrant.

Oporornis tolmiei (Townsend)

Tolmie Warbler

Observed only during the spring migration. At Cabezon, during May, a few were seen almost daily until the 19th. Several were noted at Dos Palmos, in the dense vegetation along the creek, as late as May 27.

Four specimens were secured: Cabezon, three (nos. 1754-1756), Dos Palmos, one (no. 2543).

Geothlypis trichas occidentalis Brewster

Western Yellowthroat

Yellowthroats were fairly common in the vicinity of Cabezon during the first three weeks in May, and at Snow Creek during the ensuing week. From their actions these birds were evidently migrants, as they were generally observed far from water, flitting through the desert brush. The only other place where the species was encountered was at Vallevista, at the western base of the

range. Here a single specimen was taken, again a migrant, shot in a desert wash, miles from the nearest stream.

Three specimens were secured, an adult male at Cabezon, May 19 (no. 1767), an adult female at Snow Creek, May 27 (no. 2157), and an adult female in fresh winter plumage at Vallevista, August 30 (no. 3130).

The male bird, in its small size and dull coloration, is quite different in appearance from the breeding bird of southern California, *G. t. scirpicola*, and it, we believe, should be referred to *occidentalis*. The females of the two forms are not easily distinguished; but as *scirpicola* on the coastal sides of the mountains begins nesting early in April, we are justified in considering the Snow Creek female, taken May 27, migrating, as also being *occidentalis*. Probably all of the migrants traveling along the eastern base of the mountains at this time were of this subspecies.

The Vallevista bird is not with certainty identifiable, but it was evidently a migrant, whereas *scirpicola* is resident in the San Diegan district. Yellowthroats were not found breeding at any point visited by the expedition.

***Icteria virens longicauda* Lawrence**

Long-tailed Chat

Frequently seen during May in the vicinity of Cabezon, and doubtless breeding, as the males were in full song and as individuals could be found frequenting the same places, day after day. One was heard singing in a tangled mass of shrubbery at the mouth of Murray Cañon, near Palm Springs, June 15. Not encountered above the very base of the mountains at these points, and not seen at all at the localities visited on the western slope of the range.

Two specimens were preserved (nos. 1770, 1771), taken at Cabezon, May 7 and 19.

***Wilsonia pusilla pileolata* (Pallas)**

Pileolated Warbler

At Cabezon, during the first three weeks in May, pileolated warblers were of daily occurrence, though not abundant, and

others were seen in the vicinity of Dos Palmos as late as May 27.

Three specimens (nos. 1757-1759) secured at Cabezon on May 7, 13 and 15, are referable to the subspecies *pileolata*, as in all probability is the case with all of these late migrants travelling northward on the eastern side of the mountains.

***Wilsonia pusilla chryseola* Ridgway**

Golden Pileolated Warbler

A pileolated warbler taken at Tahquitz Valley, July 30 (no. 2788) is of this subspecies. Several others, presumably of the same form, were seen in Tahquitz Valley at this time, and on Thomas Mountain, between August 16 and 21.

***Anthus rubescens* (Tunstall)**

Pipit

A single bird seen May 4 in a cultivated field near Cabezon.

***Cinclus mexicanus unicolor* Bonaparte**

Dipper

Several seen near the mouths of the cañons at Cabezon and Whitewater, during May. Other points of record were Fuller's Mill, where several were noted from June 30 to July 5, Strawberry Valley, one seen July 30, and Tahquitz Valley, where single birds were met with occasionally during the last two weeks of July.

Three specimens were preserved, an adult and a juvenal from Fuller's Mill (nos. 1990, 1991), and a juvenal from Tahquitz Valley (no. 2756). The latter, shot July 17, was full grown, and apparently caring for itself, as no adults were with it.

***Mimus polyglottos leucopterus* (Vigors)**

Western Mockingbird

A common species at the western base of the mountains, and in San Geronio Pass to the northward. In the latter region mockingbirds were seen commonly at Banning, and in diminishing numbers eastward as far as Cabezon. In the mountains proper but a single individual was encountered, at Thomas Valley, altitude about 4400 feet, on June 6.

The species apparently does not breed at the desert base of the mountains, as none was seen during our visits to the Dos Palmos region and Palm Cañon in May and June. A single bird was observed at Dos Palmos, August 26, probably a wanderer. Mockingbirds were fairly abundant at Vallevista, August 29 to September 5. Here, in common with many other birds, they were feeding largely on the ripe yucca pods, and on the fruit of the cactus.

Two specimens were taken, one at Banning (no. 2030), and one at Vallevista (no. 3105).

Toxostoma redivivum pasadenense (Grinnell)

Pasadena Thrasher

Fairly common in the lower parts of the mountains: on the Pacific side ranging from the base of the range upward through the Upper Sonoran zone, on the desert side downward to the upper edge of Lower Sonoran. Many were seen or heard singing in the brush about Kenworthy, and also at the nearby points, Vandeventer Flat and Oak Tree Spring. From these points they range continuously to the head of Palm Cañon and to the Dos Palmos region. At the latter place birds were seen at various times in May, June and August, usually along Carrizo Creek. In San Geronio Pass they were fairly common in the foothills near Banning and Cabezon. In this region, though ranging downward to the extreme base of the mountains, the birds were never seen out in the brush of the valley below.

Our highest record point in the San Jacinto Mountains was the vicinity of Schain's Ranch, altitude 4900 feet. The species was common at Vallevista, at the Pacific base of the mountains. At the time of our arrival in the mountains, at Kenworthy, May 19, full-grown young were already flying about. An immature taken at Vallevista, September 3, has not yet finished the post-juvenal molt.

Eleven specimens were preserved: Cabezon, one (no. 1655), Schain's Ranch, three (nos. 1856-1858), Banning, one (no. 2029), Kenworthy, five (nos. 2251-2255), Vallevista, one (no. 3097).

***Toxostoma lecontei lecontei* Lawrence**

Leconte Thrasher

This desert thrasher ranges westward in San Geronio Pass to the vicinity of Banning; but as most of our collecting in this region was carried on at the base of the hills, above the part of the desert floor usually frequented by the species, comparatively few of the birds were seen.

Single individuals were observed at Cabezon on various occasions from May 1 to 19, and at Whitewater, May 30, usually far too wary to admit of near approach. None was seen in the Dos Palms region, which probably lies somewhat above the normal range of the species, both altitudinally and zonally. Neither were any encountered on the desert below the mouth of Palm Cañon during our brief stay at this point, though they are known to occur in fair abundance in this general region, quite up to the base of the hills.

The one specimen collected, an adult male (no. 1656), taken May 6 at the base of the mountains near Cabezon, is not a normal example of the species, being much darker in coloration than any other specimen in the fairly large series contained in the Museum. This darker coloration is apparent in all parts of the plumage, on the concealed portions of the rectrices and remiges, as well as on the exposed feathers, and it also shows in the slightly darker brownish yellow of the crissum.

There are none but color differences apparent, the bird being of the same size and proportions as typical examples of *lecontei*, but its darker hue is conspicuous in a species in which there is ordinarily so little variation.

The fact that this bird was taken at the western extremity of the range to *T. lecontei*, and at a point where the closely related *T. r. pasadenense* also occurs, together with the fact that its coloration distinctly approaches that of the latter species, suggest the possibility of its being an intergrade or a hybrid between the two forms. *Lecontei* was formerly regarded as a subspecies of *T. redivivum*, a belief that has been rejected of late years; but in color at least, this specimen comes near to bridging the gap between the two.

***Heleodytes brunneicapillus couesi* (Sharpe)**

Northern Cactus Wren

A fairly common species at many points in the Lower Sonoran brush land at the base of the mountains, both on the Pacific and the desert sides. At the mouth of Palm Cañon, and at Dos Palmos in June and again in August, they were seen, though in small numbers, and those observed were exceedingly wild. In San Gorgonio Pass, at Cabezon, Whitewater, Snow Creek and Banning, this was one of the typical birds of the chaparral. About Vallevista, at the western base of the mountains, many were seen during the first week in September.

Nests were found as follows: At Cabezon, May 5, with two young, May 13 with four eggs, and May 15 with four eggs; at Dos Palmos, June 1, with three eggs. The breeding season is of long duration, as, although young were found in the nest early in May, others but little older were taken near the end of August.

Twenty-four specimens were collected: Mouth of Palm Cañon, one (no. 3065), Dos Palmos, four (nos. 2481-2484), Cabezon, six (nos. 1716-1719, 1773, 1774), Snow Creek, four (nos. 2056, 2058, 2154), Banning, four (nos. 2022, 2025), Vallevista, five (nos. 3099-3103).

***Salpinctes obsoletus obsoletus* (Say)**

Rock Wren

We recorded the rock wren at but few places in the San Jacintos, though there were some of these localities where it occurred in fair abundance. Several were seen at Kenworthy during May. In Palm Cañon, the middle of June, the birds were seen from 3000 feet down to the mouth of the cañon, and two full-grown juvenals were taken. About Dos Palmos and in Deep Cañon, during the last week in August, they were numerous.

Three specimens were preserved: Kenworthy, one (no. 2265), Palm Cañon, two (nos. 3063, 3064).

***Catherpes mexicanus punctulatus* Ridgway**

Dotted Cañon Wren

Although cañon wrens were not really abundant anywhere, we found them where suitable ground existed, in all parts of the mountains from the floor of the desert to the summits of some of the highest peaks. A large proportion of the specimens collected, however, were wandering juvenals, and it may very well be that the breeding adults are much more circumscribed in their summer habitat.

They were most numerous in the rocky cañons on the desert side of the range. In Palm Cañon they were seen from the desert below up nearly to Vandeventer Flat; about Dos Palmos and in Deep Cañon they were encountered in some numbers in June and August; and occasional birds were noted along the base of the mountains at Cabezón, Snow Creek, and Banning. In the higher altitudes birds were seen at Kenworthy in May, in Tahquitz Valley in July, and on the summit of Toro Peak, July 1.

Though so exclusively rock dwellers that it is generally useless to search for them amid other surroundings, cañon wrens were several times seen feeding in unusual places. Near Potrero Spring, in Palm Cañon, June 13, one was observed feeding in the branches of a piñon. At the mouth of Palm Cañon they were sometimes noted in the tops of the palm trees, dodging in and out of the downturned masses of dead leaves.

A bird heard singing near the head of Palm Cañon, June 12, when followed up and secured, proved to be a male in juvenal plumage. The song was similar to that of the adult, but softer and more subdued.

Fourteen specimens were taken, as follows: Snow Creek, four (nos. 2071, 2136-2138), points in Palm Cañon, seven (nos. 3056-3062), Toro Peak, one (no. 2465), Hemet Lake, one (no. 3006), Round Valley, one (no. 2231). Only three are adults, the remainder being all in the juvenal plumage.

Thryomanes bewicki charienturus Oberholser

San Diego Wren

Breeds in abundance everywhere in the Upper Sonoran chaparral belt of the mountains. At Kenworthy, Dos Palmos, Cabezon, and Snow Creek, in May, and at Palm Cañon, Garnet Queen Mine, Banning, and Schain's Ranch, in June, it was one of the commoner species in the brush. In midsummer, when the young birds were out, they appeared in great numbers in the higher parts of the range. In August they were noticeably abundant on the drier, brush-covered ridges surrounding Tahquitz Valley; by "squeaking" for but a few moments one could have a score of these and the house wrens gathered around. Many were observed in Round Valley, and, on each of the several occasions on which members of the expedition ascended San Jacinto Peak, San Diego wrens were seen on or very near the summit. They were fairly numerous on Thomas Mountain, August 16 to 21, at Dos Palmos, August 23 to 27, and at Vallevista, August 29 to September 5.

Full-grown juvenals appeared during the last week in May, and one bird still in juvenal plumage was taken at Vallevista August 30. Immatures in first winter plumage, and adults also finished with the fall molt, were collected at Dos Palmos, August 26, and at Vallevista August 30.

Thirty-two specimens were collected: Cabezon, three (nos. 1736, 1737, 2128), Snow Creek, one (no. 2135), Schain's Ranch, six (nos. 1949-1954), Kenworthy, two (nos. 2283, 2284), Garnet Queen Mine, five (nos. 2396-2400), Omstott Creek, one (no. 2512), Dos Palmos, three (nos. 2513-2515), Palm Cañon, three (nos. 3087-3089), Strawberry Valley, one (no. 2626), Tahquitz Valley, two (nos. 2806-2807), San Jacinto Peak, one (no. 2230), Vallevista, four (nos. 3106-3109).

Troglodytes aëdon parkmani Audubon

Western House Wren

A fairly common species in the mountains, and met with by us at every point visited; but as the higher parts of the range were explored by us rather late in the summer, when the fall dis-

persal was under way, we did not ascertain the definite breeding limits of the species. Adults were seen feeding young out of the nest, at Kenworthy, on June 8. None was observed at Dos Palmos in May and June, and probably they do not breed in that vicinity; at the end of August several were seen there. One or two were noted at the base of the mountains at Cabezon, early in May, the only point on the desert side where the species appeared to be breeding. There were a few at the Garnet Queen Mine, in June, and two were seen on the summit of Santa Rosa Peak, June 30. At other high mountain points, Strawberry Valley, Tahquitz Valley, and Round Valley, in July, they were exceedingly numerous, the majority of those collected being young birds. They were fairly abundant on Thomas Mountain, August 16 to 21.

A juvenal collected in Round Valley, July 10, is beginning to molt into winter plumage. One taken on Thomas Mountain, August 18, has completed the change.

Thirty-two specimens were collected, from the following points: Schain's Ranch, four (nos. 1955-1958), Fuller's Mill, two (nos. 2011, 2012), Strawberry Valley, seven (nos. 2689-2695), Tahquitz Valley, seven (nos. 2808-2814), Round Valley, ten (nos. 2103, 2104, 2222-2229), Kenworthy, one (no. 2279), Thomas Mountain, one (no. 3032).

***Certhia familiaris zelotes* Osgood**

Sierra Creeper

We found the creeper only at points in the Transition zone and upwards, and in but very limited numbers. In the Santa Rosa Mountains a few were seen near the summits of Santa Rosa and Toro peaks, probably not more than five or six altogether. Two broods were encountered in Strawberry Valley early in July, and a few were noted in Tahquitz and Round valleys at various times; but the species was never at all abundant.

On Santa Rosa Peak, June 28, one was seen to alight upon the face of a vertical rock, and ascend to the summit as if on the trunk of a tree, searching the crevices for insects.

Sixteen specimens were collected: Fuller's Mill, two (nos. 2013, 2014), Strawberry Valley, four (nos. 2702-2705), Tahquitz Valley, four (nos. 2769-2771, 2774), Round Valley, four (nos. 2118, 2772, 2773, 2775), Santa Rosa Peak, two (nos. 2434, 2435).

***Sitta carolinensis aculeata* Cassin**

Slender-billed Nuthatch

A fairly common species in parts of the mountains, being confined largely to the Transition zone. In the Santa Rosa Mountains we found them abundant at the Garnet Queen Mine, many juvenals being out and feeding in the trees at the time of our stay here, June 25 to 28; but higher up, near the summit of Santa Rosa and Toro peaks, but very few were seen. They were occasionally observed at Fuller's Mill and Schain's Ranch; a little higher up, at Strawberry Valley, they were more common. At still higher altitudes, in Tahquitz and Round valleys, although of daily occurrence, they were in smaller numbers. On Thomas Mountain, the middle of August, they were abundant.

Twenty-one specimens were collected: Schain's Ranch, four (nos. 1959-1962), Fuller's Mill, four (nos. 1978-1981), Strawberry Valley, three (nos. 2699-2701), Tahquitz Valley, two (nos. 2746, 2747), Round Valley, one (no. 2179), Garnet Queen Mine, six (nos. 2368-2373), Thomas Mountain, one (no. 3024).

***Sitta canadensis* Linnaeus**

Red-breasted Nuthatch

Occurs in small numbers in the limited area of Canadian zone in the highest parts of the mountains, the only places where we found them being in Tahquitz Valley and Round Valley. In Tahquitz Valley one was heard calling August 4. In Round Valley during July they were heard calling on various occasions, but from their habit of remaining in the tops of the tallest trees, it was almost impossible to catch sight of them. But one specimen was secured, an adult male (no. 2196) taken in Round Valley, July 9.

***Sitta pygmaea leuconucha* Anthony**

White-naped Nuthatch

A common species in the Transition zone and upwards. In the Santa Rosa Mountains it was noted from the Garnet Queen Mine up, being abundant in the open pine forests on the higher slopes of Santa Rosa and Toro peaks. In the San Jacinto Mountains proper it was encountered at Schain's Ranch and Fuller's Mill, and in greater numbers in Strawberry Valley, Tahquitz Valley and Round Valley. At the time we entered the altitudes frequented by this nuthatch, the third week in June, the young had already left the nest, and small flocks of parents and young together were met traveling through the woods. One or two small flocks were seen at Hemet Lake the middle of August.

Nineteen specimens were collected, as follows: Fuller's Mill, four (nos. 1982-1985), Strawberry Valley, five (nos. 2631-2635), Tahquitz Valley, one (no. 2748), Round Valley, three (nos. 2105, 2180, 2181), Santa Rosa Peak, four (nos. 2439-2442), Toro Peak, one (no. 2443), Hemet Lake, one (no. 3005).

The San Jacinto pygmy nuthatches clearly exhibit the size characters of *leuconucha*. Compared with typical *pygmaea* from Monterey Bay they are larger, with especially larger bill. The birds from all of the southern California mountain ranges, at least from the Sierra San Gabriel southward, resemble in their dimensions the Lower California form rather than the northern subspecies.

***Baeolophus inornatus murinus* Ridgway**

San Diego Titmouse

Most abundant on the desert slopes, but occurring also on the western side of the mountains, where it was encountered at various points up to 6000 feet. At Kenworthy, June 3, a pair of the birds were seen carrying insects into an old woodpecker hole thirty feet above the ground in a dead pine. At Garnet Queen Mine, the last week in June, flocks of old and young together were feeding in the trees. Other points of record are Vandevanter Flat, Schain's Ranch, Strawberry Valley and Vallevista.

Twelve specimens were collected: Schain's Ranch, three (nos. 1784, 1785, 1972), Strawberry Valley, three (nos. 2696, 2698), Kenworthy, one (no. 2278), Garnet Queen Mine, four (nos. 2391-2394), Palm Cañon, one (no. 3090).

***Penthestes gambeli baileyae* (Grinnell)**

Bailey Mountain Chickadee

In the Transition zone and upwards, this was one of the most abundant species of birds in the mountains. By the time we first reached their haunts, during the last week in June, the young were already flying about, and, attended by their parents, were conspicuous everywhere in the woods. In the Santa Rosa Mountains, both at the Garnet Queen Mine and at the summit of the range, this chickadee was the commonest species of bird. In the San Jacinto Mountains proper, from about 5000 feet upwards, they were also exceedingly numerous, being noted in the hills above Kenworthy, and at Fuller's Mill, Schain's Ranch, Strawberry Valley, Tahquitz Valley, Round Valley, and Thomas Mountain, and it was one of the species noted on the summit of San Jacinto Peak (10,700 feet), July 27. An immature male taken on Thomas Mountain, August 17, has completed the post-juvenal molt.

Forty specimens were preserved, as follows: Garnet Queen Mine, six (nos. 2363-2365, 2376, 2381, 2382), Santa Rosa Peak, four (nos. 2377-2380), Fuller's Mill, five (nos. 1973-1977), Schain's Ranch, five (nos. 1931-1935), Strawberry Valley, eight (nos. 2596-2603), Tahquitz Valley, five (nos. 2796-2800), Round Valley, six (nos. 2116, 2117, 2202-2205), Thomas Mountain, one (no. 3025).

***Psaltriparus minimus minimus* (Townsend)**

California Bush-tit

A common species in the scrub oak and chaparral of the lower parts of the mountains. On the desert side they were fairly abundant on Piñon Flat and at Dos Palmos. On the Pacific side we saw many at Kenworthy; and in the Santa Rosa Mountains as high as the Garnet Queen Mine, in the San Jacintos

as high as Strawberry Valley and, later in the summer, the summit of Thomas Mountain. A young bird taken in Round Valley, 9000 feet, July 11, and a flock seen on the ridge above Tahquitz Valley, 8000 feet, July 30, were undoubtedly summer wanderers from lower altitudes. At the San Geronio Pass side of the range they were found down to the very base of the mountains, but not out on the floor of the desert. Near Valle Vista, at the western base, they were of common occurrence during the first week in September.

A nest was found at the base of the mountains near Cabezon, May 6, presumably with eggs, as one of the parent birds was occupying it. At Dos Palmos, May 28, and at Kenworthy, June 4, flocks of old and young together were seen foraging through the shrubbery.

Twenty-one specimens were collected: Cabezon, eight (nos. 1732-1735, 2121-2124), Banning, one (no. 2050), Hurley Flat, two (nos. 1806, 1807), Kenworthy, two (nos. 2280, 2281), Dos Palmos, four (nos. 2529-2532), Strawberry Valley, two (nos. 2650, 2651), Round Valley, one (no. 2185), Valle Vista, one (no. 3132).

***Auriparus flaviceps flaviceps* (Sundevall)**

Verdin

A few verdins were seen daily at the mouth of Palm Cañon and on the desert below, June 14 to 17. Several nests were discovered in mesquite thickets at this point, some of them with the birds close at hand, but none containing either eggs or young. The species was not observed at Dos Palmos during our visits there in May and June, but later in the season, in August, several were encountered in the shrubbery along the creek. These two desert localities were the only record stations in the region.

Four specimens were collected, an adult male (no. 3083) and a non-sexed juvenal (no. 3082) from the mouth of Palm Cañon, June 15, and two juvenals from Dos Palmos, August 23 and 26 (nos. 2527, 2528). The two latter are in the midst of the post-juvenal molt, with the yellow head and chestnut wing coverts partly acquired.

We found them most elusive birds, hard to secure, or even to catch sight of, flitting through the bushes with hardly a sound; while the vegetation was so whipped about by the hard winds prevailing, that any small birds were extremely difficult to see.

***Chamaea fasciata henshawi* Ridgway**

Pallid Wren-tit

A common species in the chaparral throughout the mountains. On the San Gorgonio Pass side of the range the wren-tit, together with several other species of the same association, ranges down quite to the base of the hills, where it stops abruptly, not venturing out on the nearby desert floor. At Dos Palmos, about the point of mergeence of the Upper and Lower Sonoran zones, an occasional brood was seen wandering down from the brush to the pools in the cañon below. The birds were common at the Garnet Queen Mine, the upper limit of the brush belt in the Santa Rosa Mountains. Throughout Hemet Valley, from Vandeventer Flat to Hemet Lake, and from there on down the San Jacinto River road clear to the base of the mountains at Vallevista, the call of the wren-tit was the most familiar and often heard bird note. In the late summer they were found straying upwards far above their breeding ground. One was seen on the Tahquitz trail at about 8000 feet, July 17, and on July 22 one was heard near the summit of Tahquitz Peak, 8826 feet. The upper limit of the breeding range in the San Jacinto Mountains is probably in the neighborhood of 6000 feet.

Eleven specimens of the wren-tit were secured, from the following points: Cabezon, three (nos. 1645, 2119, 2120), Banning, one (no. 2049), Schain's Ranch, one (no. 1805), Kenworthy, one (no. 2277), Hemet Lake, one (no. 3007), Garnet Queen Mine, one (no. 2366), Dos Palmos, one (no. 2533), Vallevista, two (nos. 3128, 3129).

***Regulus satrapa olivaceus* Baird**

Western Golden-crowned Kinglet

Seen on several occasions in Tahquitz Valley and in Round Valley. They were first noted on July 26, when a small flock, probably a single family, was encountered in some willows border-

ing a cienaga in Tahquitz Valley. Two juvenals were secured, the rest taking refuge in the tree tops, where they easily eluded observation. The next day, July 27, another flock was seen in Round Valley, but in the tops of the pines out of reach. On July 29 one was taken in Tahquitz Valley. The first two specimens (nos. 2792, 2793), both females, are in juvenal plumage throughout. The last (no. 2795) is a young male molting into first winter plumage. The capture of these birds in the manner described is undoubtedly indicative of their breeding at this point. The southernmost breeding station previously recorded for California is the San Bernardino Mountains (Grinnell, 1908, p. 126), and the present instance carries the breeding range southward to the southernmost extension of the Boreal zone within the state.

***Regulus calendula cineraceus* Grinnell**

Ashy Kinglet

In Tahquitz Valley and in Round Valley, during July, kinglets were seen or heard almost daily, and the species probably breeds in fair abundance everywhere on the higher slopes leading up to San Jacinto Peak, from about 8000 feet upward. From their habit of frequenting the tree tops the birds were not easily or frequently observed, but the loud, clear song was evidence enough of their presence. After the young had left the nest they were more frequently seen in the willow thickets bordering the cienagas and streams.

Three adults were taken in Round Valley, July 8 and 11 (nos. 2182-2184). Two juvenals were taken in Tahquitz Valley, July 28 and 29 (nos. 2791, 2794), one in juvenal plumage throughout, the other with new feathers appearing on the throat and breast. Two were secured in Round Valley, August 2, a young male (no. 2789) just beginning the post-juvenal molt, and an adult female (no. 2790) which was in the midst of the annual molt.

***Polioptila caerulea obscura* Ridgway**

Western Gnatcatcher

An abundant species in the Upper Sonoran chaparral on the Pacific side of the mountains. About Kenworthy, at the end of May and early in June, they were noticeably numerous, probably

the most abundant species of bird, in full song, and undoubtedly breeding in the neighborhood. At Dos Palmos, on the desert side, occasional individuals appeared about the springs, but these had probably strayed down from the waterless Upper Sonoran chaparral slopes above. In the Santa Rosa Mountains one or two were seen at Garnet Queen Mine, and two individuals near the summit of Santa Rosa Peak, June 29.

The upper limit of the species in the San Jacinto Mountains may perhaps be indicated by its occurrence in fair abundance at Schain's Ranch (4900 feet), in lesser numbers at Fuller's Mill (6000 feet), and a single bird at Idyllwild (6000 feet), seen July 3. During the first week in May they were common at Cabezon, at the northern base of the mountains, but they may well have been migrating at that time, and no evidence was forthcoming of their breeding in the vicinity.

At Hemet Lake during the first two weeks in August gnatcatchers were migrating in large numbers, and on Thomas Mountain (6800 feet), during the ensuing week, they were also fairly numerous.

Twelve specimens were taken, from the following points: Cabezon, one (no. 1742), Schain's Ranch, three (nos. 1802-1804), Fuller's Mill, one (no. 2016), Kenworthy, six (nos. 2270-2275), Hemet Lake, one (no. 3004).

***Polioptila plumbea* (Baird)**

Plumbeous Gnatcatcher

Several were observed and an adult male secured (no. 3091), in a clump of desert willow between the mouths of Palm and Murray cañons, June 15. About Dos Palmos during the third week in August, gnatcatchers were occasionally seen in the brush, and the two specimens secured (nos. 2534, 2535), both in the juvenal plumage, proved to be of this species. These were the only occasions on which the species was encountered in the region.

***Polioptila californica* Brewster**

Black-tailed Gnatcatcher

In the San Jacinto region this species proved to be confined strictly to the Lower Sonoran zone at the western and northern bases of the range, occurring nowhere above the very lowest foot-

hills. It was found in May and June at Banning and Cabezon north of the range in San Geronio Pass. The latter place is about at the point where the Pacific flora and fauna gives place to desert species, and the black-tailed gnatcatcher is here at the eastern limit of its range, being replaced farther on by *P. plumbea*. In the brush about Vallevista, at the western base, it was one of the most abundant species.

Seven specimens were collected: Cabezon, two (nos. 1743, 1744), Vallevista, five (nos. 3133-3137). Adults and young taken at the latter point August 29 to September 5, have about completed the fall molt.

***Hylocichla ustulata ustulata* (Nuttall)**

Russet-backed Thrush

Occurs in San Jacinto Mountains apparently as a migrant only. At the northern base of the range, at Snow Creek and Cabezon, during May, it was found passing through in some numbers. At Dos Palms, during the last week in May, one or two were seen or heard daily in the vegetation along the stream. It was not encountered at any higher point in the mountains.

Six specimens were collected: Cabezon, four (nos. 1720-1723), Snow Creek, one (no. 2159), Dos Palms, one (no. 2509).

***Sialia mexicana occidentalis* Townsend**

Western Bluebird

We found bluebirds in fair abundance in the mountains at many points from 4500 feet upwards. At Kenworthy, the last week in May, they were seen daily, at this time already feeding young out of the nest. In the Santa Rosa Mountains, the last of June, we found them in some numbers from the lower edge of Transition (Garnet Queen Mine) up to the summit. On the desert side of the range the only ones noted were a pair seen in the upper part of Palm Cañon, at about 3000 feet, June 12, probably wandered down from the higher slope to the westward, attracted by the water in the cañon. In the higher parts of the San Jacinto Mountains, at Schain's Ranch, Fuller's Mill,

Strawberry Valley, Tahquitz Valley and Round Valley, blue-birds were encountered in abundance during June and July. In August numerous flocks were seen at Hemet Lake and on Thomas Mountain. Young, still in juvenal plumage throughout, were taken up to the middle of August. Adults and young collected on Thomas Mountain during the third week in August are in the midst of the fall molt.

Fifty-one specimens were collected, as follows: Fuller's Mill, four (nos. 1883, 1884, 1887, 1888), Poppet Flat, three (nos. 1885, 1886, 1946), Schain's Ranch, twelve (nos. 1936-1945, 1947, 1948), Strawberry Valley, fourteen (nos. 2675-2688), Tahquitz Valley, one (no. 2759), Round Valley, five (nos. 2085, 2176-2178, 2264), Hemet Lake, three (nos. 2991-2993), Thomas Mountain, three (nos. 3021-3023), Kenworthy, four (nos. 2266-2269), Garnet Queen Mine, one (no. 2367), Toro Peak, one (no. 2444).

The bluebird of southern California has of late been considered by some writers to be the same as the Lower California form, *Sialia m. anabelae*, and we have therefore carefully scrutinized our series of specimens for verification of this belief. No examples of true *anabelae* from the San Pedro Martir Mountains are available; but the Museum contains extensive series of breeding birds from the mountains of San Diego, Riverside, San Bernardino and Los Angeles counties and the Sierra Nevada, and small series from northern California, and from Vancouver Island. Measurements and coloration of these various series have been carefully compared, and the results do not seem to justify the recognition of a race in southern California distinct from *occidentalis*.

Occidentalis, compared with *anabelae*, shows the following characteristics: smaller size, with relatively smaller and more slender bill; adult male with blue of a different shade and with the chestnut areas of back and breast much more extensive.

Of twenty-three breeding males from the San Jacinto Mountains, twenty-one have the chestnut area on the breast extensive and continuous; in two it is divided by a narrow line of blue. Sixteen have the chestnut dorsal patch solid and extensive, and seven have it divided by blue interscapulars.

Five breeding males from Vancouver Island show much less chestnut on back and breast. Two have chestnut patch of small size on the dorsum, one has slight streaks on the scapulars, one but a few faint flecks of chestnut on the scapulars, and two are pure blue above. None have the underparts as extensively chestnut as the average southern California bird, and in each there is a tendency for this tract to be divided into two patches. Five males from the Warner Mountains, and two from Shasta County, also show this restriction of the chestnut areas, quite as much so as individuals from southern California which have been referred to *anabelae*. Thus these northern birds, which may be considered typical *occidentalis*, do not by any means show a greater extension of chestnut markings, one of the supposed characteristics of this race.

As already noted by Grinnell (1908, p. 133) wear has a great deal to do with the extent of the chestnut, freshly molted specimens invariably showing it much more extensively than others. The shade of the blue is variable in any series, the five Vancouver Island specimens showing as great extremes as do the San Jacinto birds. Comparative measurements are given below.

On the whole, we have not been able to find grounds for recognizing a form *anabelae* as occurring in California. The characters ascribed to the subspecies are so elusive and unstable, and the variation, especially in coloration, in series from any one region is so great, that the use of separate names for northern and southern California birds does not seem to serve any useful purpose, but is merely confusing. We accordingly use the older name, *occidentalis*.

COMPARATIVE MEASUREMENTS IN MILLIMETERS (MINIMUM, MAXIMUM, AND AVERAGE) OF *Sialia m. occidentalis* FROM CALIFORNIA AND VANCOUVER ISLAND

WING		
5 males from San Diego County, Calif.	107 -110	(109.0)
20 males from San Jacinto Mts.	98.5-109.5	(105.9)
5 males from Sierra Nevada, Kern Co., Calif.	100.5-107	(103.5)
2 males from Shasta Co., Calif.	103.5-106	(104.7)
4 males from Modoc Co., Calif.	* 101.5-106.5	(103.9)
5 males from Vancouver Island	101 -108	(105.5)

9 females from San Jacinto Mts., Calif.	99.5-107.5 (103.8)
8 females from Modoc Co., Calif.	88 -104 (100.2)
5 females from Vancouver Island	99 -102 (100.6)

CULMEN

5 males from San Diego County Calif.	12 - 13 (12.5)
20 males from San Jacinto Mts., Calif.	11.5- 13 (12.4)
5 males from Sierra Nevada, Kern Co., Calif.	10.5- 13 (11.6)
2 males from Shasta Co., Calif.	11 - 12 (11.5)
4 males from Modoc Co., Calif.	11 - 12.5 (11.8)
5 males from Vancouver Island	11 - 12 (11.3)
9 females from San Jacinto Mts., Calif.	12 - 13.5 (12.8)
8 females from Modoc Co., Calif.	10.5- 12.5 (11.5)
5 females from Vancouver Island	10.5- 13 (11.7)

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GENERAL ACCOUNTS OF THE MAMMALS

Odocoileus hemionus californicus (Caton)

California Mule Deer

Sign was seen plentifully in nearly all parts of the Upper Sonoran chaparral belt, and thence up through Transition, both on Santa Rosa and the main San Jacinto Mountain. On the San Geronio Pass side no evidence of the presence of deer was seen below Schain's Ranch, 4900 feet. Here and at Fuller's Mill a few tracks were seen, and a buck was jumped at the latter place June 30. In Strawberry Valley a doe with two fawns was seen July 7. In the vicinity of Tahquitz Valley, 8000 feet, during July and August, fully a dozen deer were seen, one being an old buck, the rest yearling bucks, does, and fawns. During the middle of the day the deer were staying on the sides of the low ridges margining the valley, mostly at the upper edge of the brush-patches, where these gave place to thickets of small firs interspersed with open stretches. Many beds were to be seen beneath young firs or pines, merely irregular bare places about two feet across scraped in the carpeting of pine needles. There are never any feces in or close about deer beds as there always are in the case of sheep. An occasional bed was situated on the crest of a ridge, but as a rule the animals selected locations down on the slope below, within fifty yards of the crest.

About the margins of the thickets of *Ceanothus cordulatus*, the numerous footprints showed plainly how the deer had stood and browsed. There were plenty of places where the new growth of this plant had been nibbled off. Heaps of feces along these feeding places showed that the deer defecate while browsing. In the stomach contents of a deer shot in this vicinity the only identifiable material consisted of leaves and newly grown twigs of *Ceanothus cordulatus*; it would seem that this is the chief, if not the only plant foraged upon in the Transition zone at this season.

No definite evidence was forthcoming that the deer ate grass in the meadows. Tracks showed that the streams and meadow margins were often visited, but we thought solely for water. In

one case three deer were seen in the evening standing out in an open meadow hardly one hundred yards from a band of grazing horses. The latter appeared to cause the deer no uneasiness. As far as we observed, however, the deer were not themselves grazing. Deer trails beaten into plain thoroughfares led across heads of ravines and over ridges diagonally, but seldom followed directly along the top of a ridge for any distance.

In the vicinity of Round Valley, 9000 feet, four deer were seen; sign was noted July 27 up the brushy side of San Jacinto Peak above Round Valley to an elevation of about 9800 feet, this being practically at the upper limit of *Ceanothus cordulatus*. Deer thus range in summer over the highest parts of the mountains, there being no apparent zonal limitation.

On Thomas Mountain and on the chaparral slopes in the vicinity of Hemet Peak and Oak Tree Spring above Kenworthy, sign was plentiful. On the Santa Rosa Mountains evidences of the presence of deer were not notably numerous, though the animals ranged over the whole ridge. But down on the northeast slope in the piñon belt sign was plentiful. On Sheep Mountain, about the head of Deep Cañon and across Piñon Flat to the upper walls of Palm Cañon deer were numerous. The lowest place of occurrence was at Potrero Spring, 3500 feet, near Asbestos Mountain; here one was seen June 13.

Hunting of deer is persistently carried on through each open season, and it is surprising that there are many deer left in such a limited area as is the portion of the San Jacinto region suitable to the animal's needs. Their survival is doubtless due to the large areas of heavy chaparral, which afford cover, and in many places freedom from pursuit with dogs.

Our parties procured three specimens: a two point buck (no. 2336) with horns in the velvet, near Toro Peak June 29; an old doe (no. 2338) in Tahquitz Valley, July 24; and a spotted fawn, female (no. 2337), Thomas Mountain, August 20.

***Ovis canadensis nelsoni* C. H. Merriam**

Desert Bighorn

The desert sheep or bighorn was found to occupy a definite area on the desert slope of the region chiefly below the piñon

belt, and therefore not much overlapping the habitat of the mule deer. The range of the agave and desert sheep in this region closely coincided. Sign was first seen on the west wall of the upper Palm Cañon at about 3500 feet altitude, thus on the east base of Hemet Peak. It is probable that the sheep range from here almost continuously north along the precipitous east and northeast base of the main San Jacinto ridge at least to Chino Cañon, for in February, 1912, definite information was obtained to the effect that several had been seen in lower Tahquitz Cañon close to Palm Springs, and in lower Chino Cañon.

To the east of Palm Cañon sign was observed widespread over the hills below the 3500 foot contour. On the east slope near Little Paradise, on the ridges north of Asbestos Mountain, a few individuals had wandered within the few days previous to June 17, 1908. This was also the case on and around Black Mountain. But it was the immediate vicinity of Deep Cañon which, in May, June and August, 1908, was the metropolis of the sheep. On the steep walls and nearby mesa a few hundred yards back from the rim, 2500 to 4000 feet altitude, well worn trails, footprints, and feces were plentiful. In places it looked as though a herd of domestic sheep had been over the region. A lone ram was seen on the side of Deep Cañon on May 27; a band of twelve together, on May 28, a band of ten on June 19, a band of four on August 24, a lone ram on August 25.

Two specimens were obtained: a ram of about six years of age (no. 2319) June 19, and a ewe of about two years (no. 2320), August 24.

***Sciurus griseus anthonyi* Mearns**

Anthony Gray Squirrel

Not a common species in the mountains, and seen only in the higher parts of the range, from one or two points in high Upper Sonoran upwards. Specimens were collected as follows: Round Valley, 9000 feet, two (nos. 1758, 1759); Strawberry Valley, 6000 feet, one (no. 2087); Thomas Mountain, 6800 feet, one (no. 2216); Kenworthy, 4700 feet, one (no. 2309); Garnet Queen Mine, 6000 feet, one (no. 2310). Additional points of record are

Santa Rosa Peak, Tahquitz Valley, and the road between Schain's Ranch and Fuller's Mill. It was not an abundant species at any point, two or three individuals being about as many as were seen anywhere in the course of a day's collecting.

The six specimens preserved, all adults, taken on dates ranging from June 5 to August 17, are in extremely worn and ragged pelage, some of them showing the beginning of the growth of new hair on the head, and at points on the back.

***Eutamias merriami merriami* (Allen)**

Merriam Chipmunk

A common species on the coastal slope of the mountains, mostly in high Upper Sonoran and lower Transition, ranging upward in smaller numbers to upper Transition. Specimens were collected as follows: Poppet Flat, 4000 feet, two (nos. 1645, 1668); Schain's Ranch, 4900 feet, six (nos. 1643, 1644, 1646, 1647, 1669, 1670); Fuller's Mill, 6000 feet, ten (nos. 1745-1754); Strawberry Valley, 6000 feet, six (nos. 2091-2096); Tahquitz Valley, 8000 feet, two (nos. 2156, 2157); Round Valley, 9000 feet, two (nos. 1755, 1756); Hemet Lake, 4400 feet, two (nos. 2238, 2239); Kenworthy, 4500 feet, nine (nos. 1873-1881); Garnet Queen Mine, 6000 feet, one (no. 1997); Santa Rosa Peak, 7500 feet, three (nos. 1994-1996); Toro Peak, 8000 feet, three (nos. 1991-1993); forty-six in all. Also observed on Thomas Mountain, 6800 feet, but none collected there. One was heard calling in the brush of the foothills near Banning at the north base of the mountains, the lowest point where the species was noted.

The species was everywhere an inhabitant of the chaparral. Though common on the brush-covered hills surrounding Hemet Valley, as at Kenworthy and Hemet Lake, individuals were never seen in the clumps of timber scattered in the sagebrush of the valley just below. In Tahquitz Valley, and on some of the surrounding ridges, they frequented tracts of chinquapin and young fir trees.

Round Valley, 9000 feet, is an unusually high record station for the species, but tracts of brush such as were occupied com-

monly on Tahquitz Ridge, extend with but few breaks to the former point, in fact nearly to the summit of San Jacinto Peak, and having reached Round Valley, there seems to be little to hinder the animal from ranging over the Peak. The species was not observed at any point on the desert slopes of the mountains.

Though most of the specimens collected (taken from the middle of May to the middle of August) are in good condition, as regards pelage, there is one striking exception, an adult female (no. 1876) taken at Kenworthy, May 22. On this animal the hair is worn to such an extent that the color pattern has entirely disappeared. It looked entirely black as it darted over the rocks, and is in fact sooty over the entire upper surface of the body.

***Eutamias speciosus speciosus* (Allen)**

San Bernardino Chipmunk

Thirty-nine specimens were procured, as follows: San Jacinto Peak at 10,000 feet, one (no. 1757); Round Valley, 9000 feet, twenty (nos. 1768-1777, 1798-1807); Tahquitz Valley, 8000 feet, eighteen (nos. 2129-2137, 2158-2166).

This chipmunk adhered closely to the Boreal zone on the main San Jacinto Mountains, not being seen below an altitude of 8000 feet. It was not found on Santa Rosa at all. The range of this mammal closely coincided with that of the chinquapin (*Castanopsis*). While not seen on the actual summit of the peak, *Eutamias speciosus* was noted commonly on chinquapin slopes up to 10,000 feet, and in all probability occurred all over the uppermost heights.

No young were seen up to July 20, but on the 23rd juvenals were taken, and soon after were plentiful. Nothing can here be added to the account of habits already given (Grinnell, 1908, p. 139).

The cursory examination given the series of specimens available shows no differences which, perhaps, might be expected to appear between the two colonies inhabiting the San Jacinto and San Bernardino mountains respectively, with the San Gorgonio Pass intervening.

***Ammospermophilus leucurus leucurus* (C. H. Merriam)**

Antelope Chipmunk

An abundant species along the lower desert slopes of the San Jacintos. Beginning at the southeast, the species was first encountered on Piñon Flat well up into the piñon belt. It was here observed as high as Asbestos Spring, 4500 feet. From there northeast all over the Dos Palmos and Black Mountain country it was plentiful, as also down Palm Cañon from about the 3000-foot contour to its mouth. Numerous at Palm Springs, Snow Creek, and as far up San Gorgonio Pass as Cabezon, 1700 feet. Nothing was seen of this rodent at Whitewater, where *Citellus l. chlorus* was common. Apparently the antelope chipmunk does not far invade the open sandy stretches of desert, which are complementarily occupied by *C. l. chlorus*.

An interesting discovery was the existence of *A. l. leucurus* as a colony, probably now isolated, in San Jacinto Valley. Here, around Vallevista, they occupied a wash well out from the mouth of a cañon entering the valley from the east.

Specimens of this chipmunk were taken as follows: Dos Palmos and Carrizo Creek, 3000 to 3500 feet, five (nos. 1933-1937); Palm Cañon, 3000 feet, one (no. 2058); Palm Springs, 450 feet, five (nos. 6043-6045, 6393, 6757); Snow Creek, 1500 feet, five (nos. 1508-1512); Cabezon, 1700 feet, seven (nos. 1308-1314); Vallevista, 1800 feet, four (nos. 2268-2271).

The specimens from Vallevista do not present appreciable differences from those from the desert base of the mountains. Although typically a member of the arid Lower Sonoran fauna, this rodent in places ranges higher than most other Lower Sonoran forms, even well through the Upper Sonoran, as on the north side of the San Bernardino Mountains (see Grinnell, 1908, p. 141). It is not difficult, therefore, to explain its occurrence in San Jacinto Valley by one-time invasion during a period of meteorologically favorable seasons over the intervening Upper Sonoran hills from the vicinity of Cabezon.

Both at Cabezon and Vallevista this chipmunk was observed in cactus plants, eating buds or fruits. The animals appeared to be well able to move about and handle the prickly fruits without incurring injury. In one case, however, a stout thorn

was found firmly stuck in the roof of a chipmunk's mouth. In August, when the fruits were fully ripe, the purple stain was found to have discolored not only the mouths of the chipmunks, but to have permeated the whole abdominal region internally.

***Citellus tereticaudus chlorus* Elliot**

Palm Springs Ground Squirrel

Numerous in a tract of sand dunes on the desert immediately south of the railroad station at Whitewater, 1130 feet. Here, June 3 to 5, eighteen specimens were trapped (nos. 1542-1559). Three of these are half-grown juvenals. Both young and old are distinctly grayer in color dorsally than in series of *tereticaudus* of corresponding season from the Imperial and Lower Colorado valleys, which are decidedly cinnamomeous in tone. Although we fail to detect any other differences, this peculiarity in color seems to be alone sufficient to warrant the use of the separate name, *chlorus*, of Elliot (1903, p. 242), type locality Palm Springs. The form is best regarded, in our opinion, as a subspecies of *tereticaudus*.

***Citellus beecheyi fisheri* (C. H. Merriam)**

Fisher Ground Squirrel

Twenty-eight specimens preserved as follows: Whitewater, one (no. 1560); Cabezon, nine (nos. 1405-1413); Banning, one (no. 1417); Schain's, four (nos. 1635-1637, 2706); Thomas Mountain, one (no. 2217); Strawberry Valley, nine (nos. 2078-2086); Tahquitz Valley, two (nos. 2154, 2155); Round Valley, one (no. 1760). The ground squirrel was noted also at 8500 feet altitude near the summit of Toro Peak, about Hemet Lake and through Hemet Valley, in Deep Cañon, and around Asbestos Mountain. In Round Valley, at 9000 feet altitude, it was actually abundant, as also in Strawberry Valley. The species thus ranged from the Pacific to the desert base and from the lowest zone to the highest. It does not occur, however, to the north and east far out on the desert floor, being apparently limited in that direction to the rocky foothills. This is essentially a Pacific district species, though with remarkable ability to establish itself

under extreme arid conditions, and not only this but at an altitude of much lower temperature than in its usual zone, Upper Sonoran.

While at Cabezon half-grown young were taken on May 16, the young had but just appeared in Tahquitz Valley, July 21. The difference in zone accounts for this difference in breeding season.

We have compared our San Jacinto series with *U. b. beecheyi*, from Monterey and the vicinity of San Francisco, and with topotypes of *U. b. fisheri* from northeastern Kern County, finding the San Jacinto animal to be much nearer the latter. The features as compared with *beecheyi* of west-central California, are generally paler coloration, whiter and more extended shoulder stripes, and whiter, less buffy under surface. The latter appears to us to be the most constant and therefore reliable feature for the distinguishment of *fisheri* of southern California from *beecheyi*.

***Sciuropterus alpinus californicus* Rhoads**

San Bernardino Flying Squirrel

Found at but one locality, Idyllwild, in Strawberry Valley, 6000 feet altitude. While camped here, July 4 to 15, we heard almost every night the chuckling of *Sciuropterus* in the black oaks and yellow pines around our beds. Number O steel traps and "Out-o-sight" rat traps were placed on stumps and branches around about, baited with dried prunes and fresh apricots; but these were not touched, except by jays in the daytime. On the night of July 12, four rat traps were baited with bread-butter-and-sugar and placed in crotches of black oaks about seven feet above the ground at the back of "cottage number one." Since various diurnal mammals regularly visited the garbage cans at the rear of this and other houses in Idyllwild it might be expected that nocturnal ones would also; and sure enough, the following morning our first and only flying squirrel rewarded our scheming.

The specimen (no. 2088) is an old female, at the date of capture long past breeding. Comparison with examples of *californicus* from the San Bernardino Mountains (see Grinnell,

1908, p. 138) shows not the slightest appreciable difference in colors or proportions. The San Jacinto specimen measures: length 312, tail vertebrae 146, hind foot 38. The present instance furnishes the southernmost station for any flying squirrel along the western side of North America.

***Onychomys torridus torridus* (Coates)**

Arizona Grasshopper Mouse

Nine specimens of grasshopper mouse which we refer provisionally to this form were obtained, as follows: Snow Creek, 1500 feet, four (nos. 1570, 1571, 1573, 1574); Whitewater, 1130 feet, three (nos. 1572, 1575, 1576); Cabezon, 1700 feet, two (nos. 1264, 1266). These stations are within the Lower Sonoran zone on the desert base of the mountains, this being probably the extreme western limit of the race of *Onychomys* inhabiting the Colorado desert. The paleness in coloration of the above examples, both adults and young, as compared with those from San Jacinto Valley, appears to afford sufficient ground for recognizing this and the following race from the San Jacinto region as here indicated, although no other differential features are apparent. But we are considerably in doubt as to what name to employ for the representative on the desert side. It is quite probable that this is not at all typical of true *torridus*; yet we fail to find conclusive evidence to warrant us in using the name *perpallidus* of Mearns (1896, p. 140). The Museum's entire series of *Onychomys* is inadequate. Mearns himself does not appear to have had much material at his disposal, and his characterization is not convincing.

***Onychomys torridus ramona* Rhoads**

San Bernardino Grasshopper Mouse

Four specimens secured (nos. 2251-2254), September 1 to 5, at Vallevista, in San Jacinto Valley. These are quite like examples from the vicinity of Riverside in their very dark tone of coloration and are evidently to be referred to *ramona*, thus adding another coast-belt form to the list of those occurring on the western slopes or base of the San Jacinto Mountains. One

of the above specimens is a half-grown juvenal. All were caught on the gravelly floor of the valley among scattered brush, the station being within the Lower Sonoran zone.

***Peromyscus maniculatus sonoriensis* (LeConte)**

Sonora White-footed Mouse

A series of ninety-six specimens was preserved as follows: Round Valley, 9000 feet, three (nos. 1763-1765); Tahquitz Valley, 8000 feet, twenty-two (nos. 2168-2187, 9332, 9333); Strawberry Valley, 6000 feet, three (nos. 2075-2077); Santa Rosa Peak, at 7500 feet, three (nos. 2038-2040); Kenworthy, 4500 feet, thirty-one (nos. 1811-1817, 1828-1847, 1858, 9329-9331); Valle Vista, 1800 feet, four (nos. 2255-2257, 9384); Fuller's Mill, 6000 feet, two (nos. 1649-1650); Schain's Ranch, 4900 feet, eight (nos. 1648, 1671-1677); Banning, 2300 feet, two (nos. 1463, 1464); Cabezon, 1700 feet, fifteen (nos. 1265, 1270-1283); Snow Creek at 1500 feet, one (no. 1598); Whitewater, 1130 feet, two (nos. 1577, 1599).

The species was thus captured at almost every collecting station, from the highest point at which traps were set (Round Valley, 9000 feet) to both the Pacific and desert bases of the mountains. As is notoriously the case elsewhere, this mouse ignores zone limits in its dissemination, occurring in the San Jacinto region from Lower Sonoran to Canadian, inclusive of both zones. Furthermore, it ranges indiscriminately through different associations, being caught among cactus and creosote brush on the driest desert floor, on sage flats, in chaparral, and in veratrum patches on wet Boreal meadows.

Our large series of specimens shows such a range of apparently individual variation, both as to color and size, as to baffle our attempts at segregation on geographical grounds. A paling desertwards, as with so many of the mammals of the region, might well be expected; and there may be such, if our senses or methods were refined enough to take proper account of the variation from other than geographical causes.

Taking the whole series in mass effect, we feel justified in employing for it the one name *sonoriensis*, thus following Osgood (1909, p. 93) in the disposition of his material. Many individual

skins might upon their separate merits be referred to *gambeli*, and it is patent that the mean of the whole aggregate might fall between typical *sonoriensis* and typical *gambeli*; but we feel that the leaning of the mode is most strongly toward the former. The San Jacinto region is again shown to lie on the borderland between two faunal areas, their distinctive forms here blending or hybridizing, which, is not easy to say. Osgood (1909, pp. 68-70, 91) has admirably treated of the problem in similar situations in his revision of the genus *Peromyscus*.

***Peromyscus boylei rowleyi* (Allen)**

Rowley White-footed Mouse

Our collection contains 131 specimens apportioned by localities as follows: Garnet Queen Mine, 6000 feet, twenty-three (2008-2028, 9334, 9335); Kenworthy, 4500 feet, five (nos. 1790-1794); Thomas Mountain, 6800 feet, twelve (nos. 2218-2228, 9337); Hemet Lake, 4300 feet, two (nos. 2242, 2243); Strawberry Valley, 6000 feet, twenty-one (nos. 2098-2117, 2128); Tahquitz Valley, 8000 feet, fourteen (nos. 2203-2215, 9336); Round Valley, 9000 feet, thirteen (nos. 1767, 1778-1789); Fuller's Mill, 5900 feet, eighteen (nos. 1717, 1728-1744); Schain's Ranch, 4900 feet, twelve (nos. 1678-1689); Cabezon, 1700 feet, four (nos. 1268, 1269, 1585, 9338); Snow Creek, 1500 feet, four (nos. 1584, 1586-1588); Dos Palms Spring, 3500 feet, three (nos. 1910-1912).

This species would appear to be about as widely distributed through this region as *Peromyscus m. sonoriensis*; for it is recorded from fully as many stations. But *P. b. rowleyi* has much more marked associational restrictions, being very closely confined to the vicinity of water courses. Although ranging from Lower Sonoran, as at Cabezon, to the highest station in Boreal where any trapping was carried on, the low zone captures were made along streams where the contention might well be made that at least one zone higher was the one really present, although closely hemmed in on either side by the lower zone. The metropolis of *rowleyi*, judging from its distribution elsewhere in southern California as well as in the area under consideration, is

evidently the riparian association within the Transition zone. From this focus it invades both above and below along favorable routes.

At Garnet Queen Mine this mouse was found up the shaded cañon sides beneath golden oaks, as well as down along the stream. In Strawberry Valley many were caught along the alder-lined creeks, often beneath undercut banks overhung with gooseberries and tangles of roots. At still higher altitudes those caught evidently had their headquarters in the clumps of willows outlining the veratrum meadows.

The three specimens from the desert edge, at Dos Palmos Spring, were trapped along the water course marked for a short distance by a scanty seepage. A remarkable circumstance was the occurrence at this point, in fact within the course of one line of traps, of no fewer than four species of the one genus *Peromyscus*, namely, *stephensi*, *cremicus*, *martincensis*, and *rowleyi*. This situation evidently resulted from the commingling of representatives from the two faunas which abut at this point, the first two species belonging to the arid contingent.

Fully as interesting as those cases where there is a clear transition through the San Jacinto region from one subspecies to another, as in certain species of *Perognathus* and *Neotoma*, are those cases where no trace of such modification is evinced. *Peromyscus b. rowleyi* offers an instance of the latter sort, as it ranges from one extreme of geographical conditions almost to the opposite, and as far as we are able to detect there is not the slightest variation displayed other than due to age, sex, and individual peculiarity.

As a possible explanation of this indifference we may offer, that the associational predilections are in this mammal of more weight than zonal, and the association followed is nearly uniform. Further, *P. b. rowleyi* is an animal whose focus of dispersal is in a *high* zone, so that upon a mountain like San Jacinto its range fits over the topography like a mantle. It appears to be altogether those animals of Upper and Lower Sonoran, and of wide range in adjacent areas where they have separately differentiated, which exhibit geographical modification within the relatively short distance embraced in the north-and-south diam-

eter of the San Jacinto region. It is probable that in these animals the higher mountain ridge serves as a barrier. Although obviously of no great length and even not continuous, this barrier is doubtless to some degree effective in isolation.

It is the animals of the *lowest* zone which exhibit the most divergent characters at the two faunally most divergent bases of the mountain.

***Peromyscus truei martirensis* (Allen)**

San Pedro Martir Big-eared Mouse

As indicated by our trapping, this mouse is, with the exception of *P. c. stephensi*, the least common of the genus in the area explored. But fifteen examples were secured, as follows: Santa Rosa Peak, 7500 feet, six (nos. 2029–2034); Strawberry Valley, 6000 feet, two (nos. 2127, 2138); Kenworthy, 4500 feet, five (nos. 1797, 1808–1810, 1913); Dos Palmos Spring, 3000 to 3500 feet, two (nos. 1914, 1915).

They were trapped only on dry chaparral-covered hillsides. As noted from the localities of capture there is considerable zonal range, Dos Palmos Spring being well down into the area of blending of Upper with Lower Sonoran, while the stations on Santa Rosa Peak and in Strawberry Valley were in areas of mingling of Upper Sonoran and Transition elements. It would appear that Upper Sonoran chaparral of the Pacific slope is the locally preferred habitat of this mouse.

We follow Osgood (1909, p. 171) in the name assigned to this mouse. The series is pale-colored as compared with representatives of *truei* from Mount Pinos, Ventura County. The latter are evidently somewhat intermediate towards *P. l. gilberti*. Our examples, however, have not nearly so long tails as the measurements given for topotypes of *martirensis*. Thirteen adults give a tail length of 102.5 (83–111) as contrasted with “116.5 (112–122).” It is evident that the San Jacinto animals average somewhere between typical *truei* and *martirensis* in sum total of characters, though not deserving of separate recognition in nomenclature.

***Peromyscus crinitus stephensi* Mearns**

Stephens Cañon Mouse

Detected at but one station, Dos Palmos Spring, 3500 feet, where two adults (nos. 1908, 1909) were trapped June 1, along the steep rocky wall of the ravine just below the two palms from which the place receives its name. These specimens are quite indistinguishable from the Museum series of the species from Victorville on the Mojave Desert and from the California side of the Colorado River.

***Peromyscus californicus insignis* Rhoads**

Southern Parasitic Mouse

Thirty-five specimens obtained, as follows: Tahquitz Valley, 8000 feet, one (no. 2198); Kenworthy, 4500 feet, two (nos. 1795, 1796); Schain's Ranch, 4900 feet, fifteen (nos. 1690-1697, 1708-1714); Banning, 2200 feet, three (nos. 1414-1416); Cabezon, 1700 feet, thirteen (nos. 1267, 1323-1332, 1581, 1582); Snow Creek, 1500 feet, one (no. 1583).

The distribution of this mouse is typically Upper Sonoran, coinciding with the chaparral belt of that zone. The single example from Tahquitz Valley was far up in Transition, though in actual distance the interval to be traversed in reaching the place was not great; a belt of cherry and manzanita brush was continuous down the slope to the east. Of casual interest is the fact that not one example of this mouse was taken as a result of all our trapping in Tahquitz Valley; the specimen obtained was found drowned in a pitcher of milk at the summer camp in the valley.

The occurrence of the species so far down zonally as Cabezon and Snow Creek is noteworthy, for especially the latter point is well into Lower Sonoran. As far as we are able to discern the series from the desert slope differ in no way from those from the Pacific slope, and these in turn are identical with topotypes of *insignis* from Dulzura, San Diego County.

***Peromyscus eremicus eremicus* (Baird)**

Desert White-footed Mouse

The seventy-five specimens collected represent localities as follows: Banning, 2300 feet, eight (nos. 1449-1456); Cabezon, twenty (nos. 1284-1300, 9339-9341); Snow Creek at 1500 feet, eight (nos. 1563-1567, 1578-1580); Palm Springs, 450 feet, three (nos. 5983, 5984, 6803); Palm Cañon, at various altitudes, ten (nos. 2068-2074, 9342-9344); vicinity of Dos Palms Spring, 3000-3500 feet, twenty-six (nos. 1940-1947, 1958-1967, 1998-2005).

It is observable that all of these localities are on the desert side of the mountains, and all are either well within the Lower Sonoran zone, or at highest (Banning) in the belt of blending of that zone with the next higher. Thus, within the same genus, we find a species (*sonoriensis*) apparently oblivious of temperature range, while the present, *eremicus*, is closely limited to the climatic conditions obtaining in one division of one zone.

The desert white-footed mouse appears to affect by preference sandy ground rather sparsely provided with clumpy xerophytic shrubs.

Our series of specimens is very uniform in the main observable characters, save as obviously due to age. The specimens from Banning are a trifle the darkest, a possible tendency towards *P. e. fraterculus*, the Pacific Coast race of the species. The latter, however, we failed to find in San Jacinto Valley, though we had anticipated its occurrence there. The series as a whole closely resembles material from the lower Colorado Valley. In mass effect the latter are faintly paler-colored.

***Reithrodontomys megalotis longicauda* (Baird)**

Long-tailed Harvest Mouse

Localities of capture were: Banning, 2200 feet, five (nos. 1457-1461); Cabezon, 1700 feet, five (nos. 1301-1305); Snow Creek, 1500 feet, one (no. 1569); Schain's Ranch, 4900 feet, three (nos. 1632-1634); Strawberry Valley, 6000 feet, one (no. 2097); Hemet Lake, 4400 feet, three (nos. 2244, 2245, 9345). The last

three stations were the highest at which the species was found to occur, these being barely within the limits of Lower Transition. The species here as elsewhere seems to be essentially Sonoran, and affects grassy places of not too moist a character.

Examination discloses no obvious differences between specimens from the San Geronio Pass base of the mountains and the few from the Pacific side. There is some variation, and, as in series from elsewhere in southern California, certain examples appear to be more reddish on the rump than any from the San Francisco Bay region. The general tone of coloration, however, is not decisively paler than in the northern animals; and the San Jacinto series, as far as it goes, is satisfactorily referable to *R. m. longicauda*.

***Neotoma intermedia intermedia* Rhoads**

Dulzura White-footed Wood Rat

***Neotoma intermedia gilva* Rhoads**

Banning White-footed Wood Rat

***Neotoma intermedia desertorum* C. H. Merriam**

Desert Wood Rat

One hundred and two specimens of wood rats of the *intermedia-desertorum* category are in our collections from the San Jacinto region. In spite of the fact that the genus *Neotoma* has been but recently monographed (Goldman, 1910), this portion of our material has given us much trouble in its determination. In Goldman's paper referred to, *intermedia* (with its subspecies *gilva*) and *desertorum* are treated not only as distinct forms, but as species belonging to two "groups"—and not nearly related ones—of the subgenus *Neotoma* within which the author recognizes six such subdivisions. This is a departure from the early views of C. H. Merriam (1894, pp. 117-120), who recognizes but four groups, in one of which, "the *desertorum* group," he includes both *intermedia* and *desertorum*. The results of our study prove to be most in accord with the latter view, and even suggest strongly the propriety of considering *desertorum* as but a subspecies of *intermedia*.

Our material from the limited region under consideration hails from the following localities: Garnet Queen Mine, 6000 feet, two specimens (nos. 2056, 2057); Kenworthy, 4500 feet, three (nos. 1868, 1871, 1872); Vallevista, 1800 feet, thirteen (nos. 2289-2301); Banning, 2200 feet, twenty-five (nos. 1424-1448); Cabezon, 1700 feet, twenty-three (nos. 1333-1338, 1341, 1343-1354, 1524, 9346-9348); Snow Creek at 1500 feet, thirteen (nos. 1513-1517, 1525-1532); Whitewater, 1130 feet, nine (nos. 1518-1523, 1533-1535); Palm Springs, 450 feet, one (no. 6969); Palm Cañon at 800 feet, two (nos. 2066, 2067); Palm Cañon at 2500 feet, one (no. 2065); Dos Palmos Spring, 3500 feet, ten (nos. 1948-1957).

The first three localities are on the Pacific side of the mountains. The specimens from Garnet Queen Mine were trapped around a loose rock wall serving to retain a roadway on an Upper Sonoran chaparral hillside. Those at Kenworthy, also in Upper Sonoran, were taken near crevices in huge boulders surrounded by chaparral. In the vicinity of Vallevista the animals were taken along banks of washes, where they lived in holes in the ground, with no vestiges of houses.

The remainder of the localities of capture are all on the desert slope of the mountains. The series from Banning, Cabezon, and Snow Creek were trapped along the foothills forming the southern margin of San Geronimo Pass. Those at Whitewater and Palm Springs were on the floor of the desert about patches of cactus and creosote bushes. Around Dos Palmos Spring the animals were inhabiting rock piles almost exclusively; there were no stick houses, only occasional scant accumulations of the shriveled remains of cactus fruits. Zonally, the Banning station is at the lower edge of Upper Sonoran, while all the other desert slope stations are in Lower Sonoran, Palm Springs, and Whitewater being far down in that zone.

In studying our series of white-footed wood rats we have reviewed appurtenant literature for the purpose of finding out what characters have been thought to be of service in distinguishing *intermedia*, *gilva*, and *desertorum*. The features so employed are: General coloration, quality of pelage, general size, relative size of ears, relative length of tail, general size and angularity

of cranium, shape of interparietal, width of interorbital constriction, development of supra-orbital "bead," shape of nasals, relative size of audital bullae, and outline of palate posteriorly.

First, as leading to clearness in the discussion to follow, we herewith present a comparative diagnosis of *intermedia* and *desertorum*, the former based upon a series from the vicinity of San Diego, the latter upon a series from along the Colorado River between Needles and Yuma.

DOUBLE-COLUMN DIAGNOSIS OF NEOTOMA I. INTERMEDIA VERSUS N. I.
DESERTORUM

Neotoma i. intermedia

General coloration above dark: blackish mid-dorsally, mixed with clay color, this most pure along the sides and about the face; beneath white, with much deep plumbeous at bases of hairs throughout (occasional examples with hairs on small pectoral patch white to base); ankles dusky; tail black above.

Pelage harsh: hairs relatively stiff and coarse.

Size large: average 13 males, length 336, tail vertebrae 159, hind foot 34.3, ear 30.4. (For females and range of variation see figs. A-C).

Tail "long": ratio of tail to body in 13 males, 89%.

Skull large throughout, this involving all features, save that rostrum and nasals are relatively longer and narrower, while audital bullae are actually as well as relatively less inflated.

Neotoma i. desertorum

General coloration above pale: sepia mid-dorsally, mixed with pinkish buff, this color clearest anteriorly and along sides; beneath white, with slight amount of pale plumbeous at bases of hairs except on pectoral region and narrow line mid-ventrally which are pure white; ankles white; tail grayish brown above (variable to blackish).

Pelage soft: hairs relatively fine and silky.

Size small: average 10 males, length 288, tail vertebrae 134, hind foot 30.8, ear 28.5. (For females and range in variation see figs. A-C).

Tail "short": ratio of tail to body in 10 males, 87%.

Skull small throughout, this involving all features, save that rostrum and nasals are relatively shorter and hence blunter, while the audital bullae are distinctly larger, more inflated.

Length of ear is not included in above tabulation, because found by us to be of inappreciable difference in size proportionally. It will be noted that the emphasized character of relative tail length is really very small!

We have tested the matters of angularity of skull, shape of interparietal, width of interorbital constriction, development of supraorbital bead, and outline of palate posteriorly, and find all these features subject to much variation. Of course age has been taken into account in our examination, as indicated by degree of emergence and wear of the molar teeth. As far as our studies have gone none of the features just mentioned affords a character of tangible worth in distinguishing *intermedia* from *desertorum*. The general large size of *intermedia* covers much of the alleged difference in minor features.

According to Goldman in his revision (1910, p. 45) *N. i. gilva* is identical with *intermedia* in cranial characters and general size, differing only in paler, more yellowish, coloration. It is further stated (Goldman, 1910, p. 76) that "in general appearance" *desertorum* "closely" resembles *gilva*.

The above preliminary outline of the elements to be considered brings us to the critical treatment of our series of white-footed wood rats from the San Jacinto area. At the outset we are confronted by a baffling lack of uniformity exhibited throughout the material. Characters of *N. i. intermedia*, *N. i. gilva* and *N. i. desertorum* are varyingly presented. The situation is therefore best met by dealing with each locality separately.

Of the two specimens from Garnet Queen Mine, one is young, the other an old adult male. The latter measures small for *intermedia*; its skull is small with relatively blunt rostrum, like *desertorum*, but the audital bullae are small as in *intermedia*. In color both specimens are paler than *intermedia* and identical with examples from Banning, the type locality of *gilva*.

The three specimens from Kenworthy, two old adults and one young one, are in their dark colors throughout good *intermedia*. But they are, again, rather small: male, 320 x 152 x 33; female, 295 x 130 x 32. [To appreciate size values, the appended charts, figs. A-C, should be consulted.] Cranially these examples are slightly smaller than average *intermedia*, but otherwise identical with this form, topotypes of which are at hand from Dulzura.

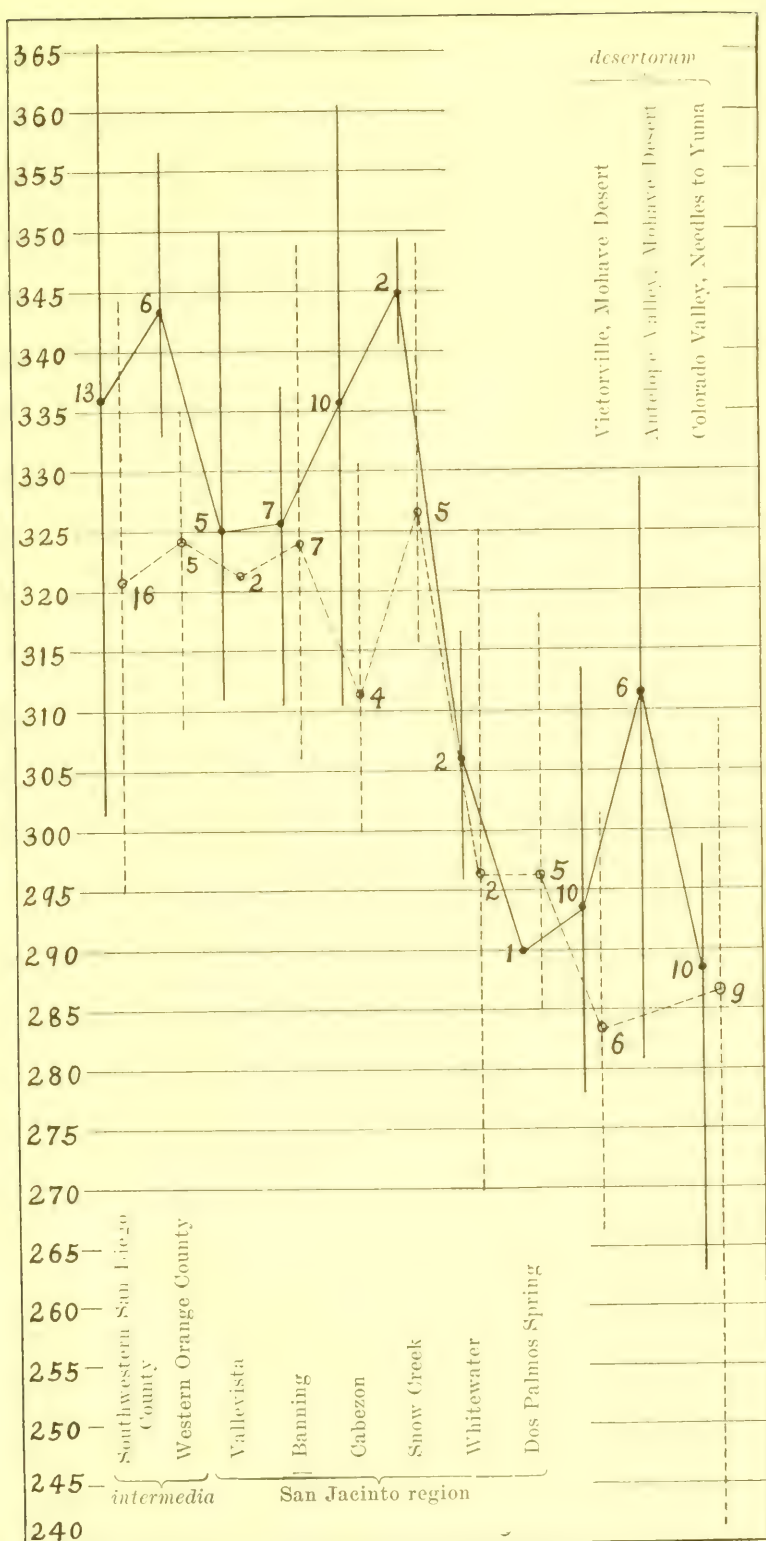
The Valle Vista series of thirteen are cranially *intermedia*; in coloration they are pale like the Banning series, save that one example (no. 2293) is paler still, practically the same shade as

in *desertorum*. The pelage of this example is slightly harsher, however, and the skull is as in *intermedia*. These Valle Vista wood rats average smaller than *intermedia* proper, in this respect again resembling the topotypes of *gilva*.

The name *gilva* was applied (Rhoads, 1894, p. 70) to a white-footed wood rat from Banning. Our series of twenty-five from that locality are thus topotypes. They bear out the single assigned character of *gilva* (as compared with *intermedia*), namely, general paleness of coloration. They show in addition an average smaller size than San Diego County *intermedia*, a slight resemblance to *desertorum*. An analysis of the color characters shows also in all respects an approach to *desertorum*: As compared with *intermedia* there is less of the black admixture mid-dorsally; the brown tones are paler, more buffy; ventrally the white is more extensive, in other words, the plumbeous occupies a less space on the individual hairs, and there is more frequently a pure white pectoral patch; the upper side of the tail is less black, more brownish. Contrary to Goldman's statement (1910, p. 45) that cranially *gilva* is like *intermedia*, we find that Banning old adults have visibly smaller and lighter skulls than *intermedia* from the vicinity of San Diego, and the rostrum and nasals are shorter. Thus far the resemblance is towards *desertorum*, but the audital bullae are notably smaller than in that form, and no larger than in *intermedia*.

Cabezon, farther down the San Geronimo Pass towards the desert proper, furnishes twenty-three examples for our study. These are apparently identical in color with the Banning series, and hence the same general remarks apply. Cranially, too, the two series are practically alike. In measurements, the Cabezon males are larger, and the females are smaller, respectively, than in the Banning animals. These differences are likely therefore to

Fig. A (on opposite page). Diagram showing individual and geographic variation in total length (in millimeters) of certain adult white-footed wood rats. Solid lines, males; broken lines, females; figures at left and right of these lines, respectively, indicate numbers of individuals measured; length of lines shows range of individual variation; points connected by solid and broken lines, respectively, mark positions of averages. Note general reduction in the dimension geographically from the San Diegan district (at left) through the San Jacinto region to the desert.



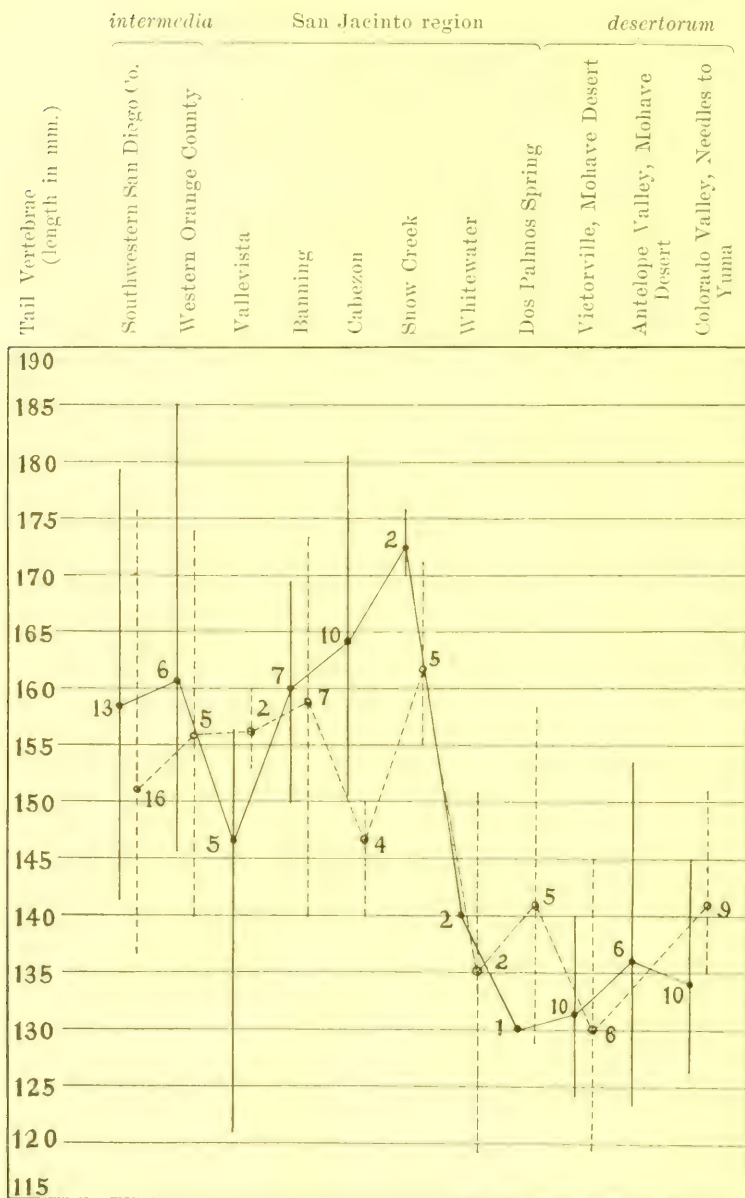


Fig. B. Diagram showing individual and geographic variation in length of tail of certain adult white-footed wood rats. Solid lines, males; broken lines, females; figures at left and right of these lines, respectively, indicate numbers of individuals measured; length of lines shows range of individual variation; points connected by solid and broken lines, respectively, mark positions of averages. Again note general reduction in the dimension geographically from the San Diegan district (at left) through the San Jacinto region to the desert.

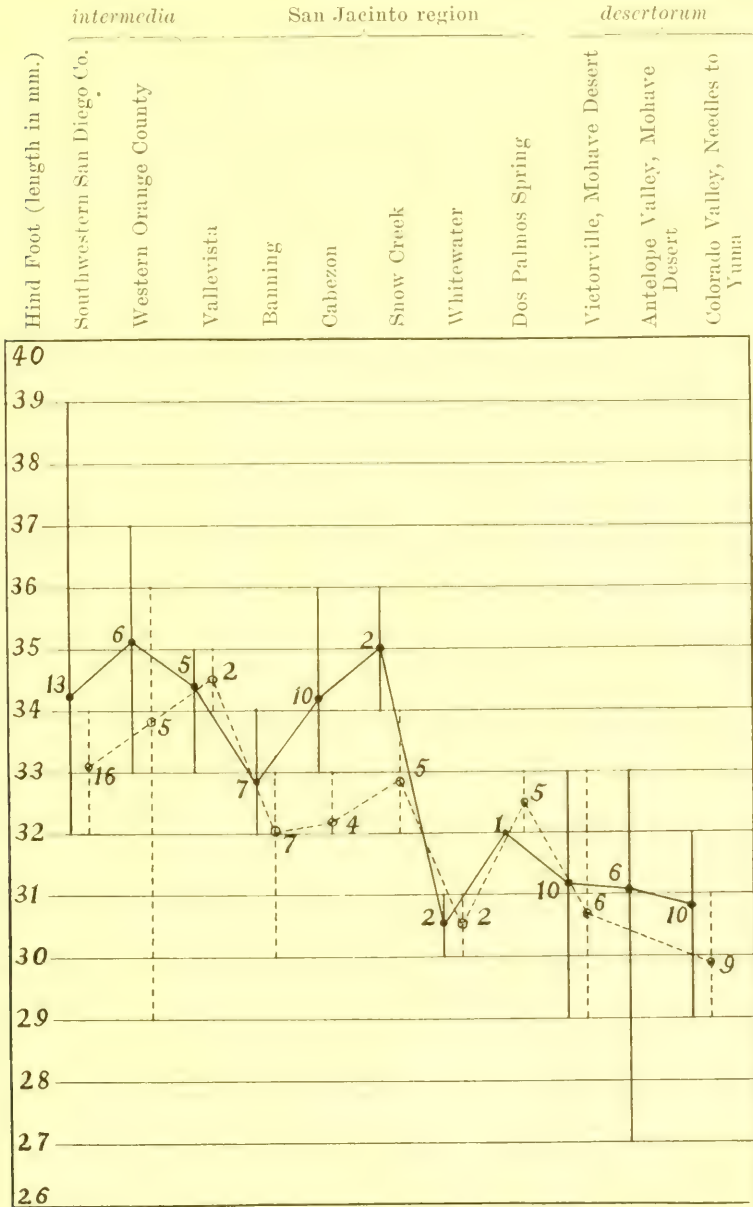


Fig. C. Diagram showing individual and geographic variation in length of hind foot of certain adult white-footed wood rats. Solid lines, males; broken lines, females; figures at left and right of these lines, respectively, indicate numbers of individuals measured; length of lines shows range of individual variation; points connected by solid and broken lines, respectively, mark positions of averages. Again note general reduction in the dimension geographically from the San Diegoan district (at left) through the San Jacinto region to the desert.

accrue from the smallness of the series involved, rather than to be of any deeper significance.

From Snow Creek, up in the foothills three miles southwest of Whitewater, there are thirteen specimens, including adults and young. These are distinctly paler than the average of the Cabezon and Banning series. All, in fact, are to be matched from *desertorum* in seasonally comparable pelage. In amount of black dorsally and white ventrally, tint of yellowish brown laterally, and dorsal color of tail, we are unable to distinguish them from *desertorum*. Also is this true in quality of pelage, though the series is in worn breeding stage, and hence not so soft as *desertorum* is in fresh fall pelage. In size some Snow Creek examples are well toward the upper limit of the range of variation in *intermedia*: the series averages large. Cranially old adult males are still large, like the ones from Cabezon and Banning, though not so large and long-snouted as *intermedia* proper. The audital bullae remain small, but with evident variation.

From Whitewater station, on the floor of the desert sloping up toward San Geronimo Pass, and only three miles from the station at Snow Creek, there are nine, mostly young. These all show the small size, pale coloration, and soft pelage of typical *desertorum*. [See charts showing variation in measurements, figs. A-C, which take account only of adults.] Cranially we can see no difference from *desertorum*, except in audital bullae, which are appreciably smaller. This difference, however, vanishes when selected examples of *desertorum* are lined up with the Whitewater crania in proper sequence; in other words, while there is average difference in this respect, individual variation (or the results of interbreeding) bring an overlapping or intergradation. From *intermedia* and *gilva* from Banning, the Whitewater crania are markedly distinguished by lesser bulk and shortness of rostra and nasals.

Unfortunately we have from Palm Springs, well out on the floor of the desert, but one example. This in all respects, including audital bullae, is quite typical of *desertorum*. It is noteworthy that an obvious intergrade between *desertorum* and *intermedia* has been described from Palm Springs. This is "*Neotoma*

bella'' (Bangs, 1899, pp. 66, 67). Judging from those of the ascribed characters which are at all pertinent, the type specimen was nearest *desertorum*. Moreover, Goldman (1910, p. 78) synonymizes the name *bella* under *desertorum*.

The thirteen specimens from Palm Cañon are small, like *desertorum*, with small skulls just like the Whitewater ones, but are rather coarser pelaged and are dark, being almost facsimiles of Banning and Cabezon examples of corresponding age.

The series of ten adults and young from the vicinity of Dos Palmos Spring are indistinguishable in respect to size, quality of pelage, and coloration, from *desertorum*. Cranially they are also duplicates save in one respect, that of audital bullae, which are plainly less inflated.

It is shown by the foregoing array of facts that, in the white-footed wood rats of the San Jacinto area, there are two diverse types on the remoter parts of the opposite sides of the mountains, namely, *intermedia* on the Pacific side, most typically represented by the specimens from Kenworthy, and *desertorum* at the desert base, as illustrated at Whitewater, Palm Springs, and perhaps Dos Palmos. The point of emphasis is that our material, as interpreted by us, would seem to establish complete intergradation between the extreme types named. In all respects as enumerated, we find transition through various intermediate degrees of difference from one extreme to the other. This is not in accordance with currently accepted notions as regards the relationship between *intermedia* and *desertorum* (see Goldman, 1910); but were we without recourse to previous literature, we should unhesitatingly place one form as a geographic race of the other without considering any explanation of our position as called for.

That extensive intergradation between the above-named forms in the San Jacinto region is a fact, we are confident. The only argument in rebuttal of the subspecific idea is that our intermediates are in the nature of hybrids. This contention would find evidence for support in the narrowness of the area occupied by wood rats showing intermediate characters between *intermedia* and *desertorum*, and in the manifest lack of uniformity of variation from place to place.

But we would here express our grave doubts as to there being any intrinsic difference between the results of long-continued hybridization, and "intergradation."

As illustration of the unevenness in variation from place to place, to be fair, we would instance that different localities produced wood rats of such combinations of characters as: (1) small size, dark coloration and short rostrum; (2) large size, pale coloration and long rostrum; (3) pale coloration, short rostrum and small bullae; (4) pale coloration, long rostrum and small bullae; etc.

All sorts of *degrees* of characters in combination are presented, that is, as limited only by the extent of our material, so that the above array of combinations is the result only of judicious selection on our part. In no instance were both typical *intermedia* and *desertorum* found in the same locality with examples of intermediate nature. Again, it is to be observed that both on the Pacific slope of southern California, and on the desert, *intermedia* and *desertorum* occupy almost identically the same ecologic niche, with resulting similarity in habits.

The above facts might be interpreted into some form of Mendelian behavior. At any rate they appear to support the theory of hybridization, though the process, of whatever nature, has obviously proceeded so far that the real history is not subject to solution with the data at hand. The possibility of "direct action of environment" in the area of intermediate conditions between the desert and Pacific districts also enters the problem. As previously implied our data furnishes no criterion by which to distinguish here between the results of "geographic intergradation" and of hybridization.

All the facts herein set forth point, by our interpretation, to the probability that *intermedia* is a Pacific slope race of the species represented also by *desertorum* of the arid interior, and that through the major portion of the San Jacinto region we find geographic intergradation comparable to the condition in certain species of *Perognathus*, *Peromyscus*, *Dipodomys*, and *Onychomys*, as elsewhere treated in the present paper.

The fact that in the white-footed wood rats the opposite extremes are much more diverse than in the cases of the rodents

just named, probably accounts for the greater conspicuousness of the irregularities in intergradation. These peculiarities thus involve less amounts of difference in characters in the rodents named, so that "uniformity" in blending may be more apparent in them than in the wood rats. The narrowness of the area of intermediate climatic conditions appears to us also to contribute to the causes of the lack of smoothness in the intergradation of the wood rats.

At any rate, systematically the proper thing is to employ the trinomial with the wood rats as well as with the rest, and since the name *intermedia* was first proposed in this group, it takes precedence in specific combination, as presented in the heading of this article.

As to the proper name to use for the majority of the San Jacinto specimens, namely, those of intermediate nature, difficulty of determination is obvious. Feeling compelled to give some name to every specimen, we prefer to lump most of the intermediates under the name *gilva*, which was originally applied to some sort of intermediate. Thus the Kenworthy specimens alone merit the name *intermedia*, while the ones from Palm Springs, Whitewater, and Dos Palmos may be with reason included under the name *desertorum*, all other locality series bearing the name *gilva*.

***Neotoma fuscipes mohavensis* Elliot**

Mohave Brown-footed Wood Rat

An abundant inhabitant of the Upper Sonoran chaparral belt chiefly on the Pacific drainage. Our collections contain fifty-one specimens representing the following stations: Garnet Queen Mine, 6000 feet, eleven specimens (nos. 2035-2037, 2048-2055); Kenworthy, 4500 feet, ten (nos. 1851-1857, 1868-1870); Thomas Mountain, 6800 feet, one (no. 2230); Strawberry Valley, 6000 feet, five (nos. 2122-2126); Schain's, 4900 feet, twenty (nos. 1698-1707, 1718, 1727); Cabezon, 1700 feet, four (nos. 1339, 1340, 1342, 1355).

In Strawberry Valley and on Thomas Mountain, this wood rat was fairly numerous, and was associated with some Transition zone elements as well as with other Upper Sonoran forms.

At Cabezon, the few animals captured were found in a belt of mingling of Upper and Lower Sonoran forms. The zonal position, Upper Sonoran, is indicated by these extremes.

At all points where the species was found, the characteristic stick houses were more or less in evidence. They were built up to especially large size beneath scrubby golden oaks close around the Garnet Queen Mine. At Vandeventer Flat very large nests occupied positions high in the live oaks.

The series of fifty-one specimens of this wood rat, as compared with satisfactory material from the vicinity of San Diego, shows distinctly paler coloration, sufficiently different in degree to warrant the use of a separate name.

Our four specimens from Cabezon, the only ones from the desert slopes, are no paler than the Kenworthy and Garnet Queen Mine series. Some examples from each locality show nearly pure white feet and more distinctly bicolored tail than in average *macrotis*. Since the name *macrotis* should be restricted to the dark coast form, it appears necessary to use the name *mohavensis* for the pale brown-footed wood rats of the whole San Jacinto area, just as has been done with the specimens from the San Bernardino Mountains (see Grinnell, 1908, p. 147). This seems a better course than to include the San Jacinto series under the name *macrotis*, as done by Goldman (1910, p. 94).

***Microtus californicus californicus* (Peale)**

California Meadow Mouse

Found in small numbers in widely scattered localities, suitable ground for this rodent being limited in this region. Two adults (nos. 2240, 2241) were trapped on grassy banks close to Hemet Lake, 4400 feet, August 7 and 10. Four adults (nos. 2199-2202) were taken in the veratrum patches in meadows in Tahquitz Valley, 8000 feet, July 24, 28 and 29. An immature (no. 1766) was secured at the meadow in Round Valley, 9000 feet, July 10. An adult (no. 2007), was taken at the edge of the little stream at Garnet Queen Mine, June 27. At the latter place faint runways were observable in the low vegetation close to the stream.

We had anticipated finding *Microtus mordax*, or some related form, at least, at the upper elevations; but all the *Microtus* secured, as above specified, are unequivocally referable to the *californicus* group. In the San Bernardino Mountains, a representative of the *mordax* group is present in the Boreal zone, and *californicus*, also, is present but occupies a lower belt (up to 7500 feet altitude), the ranges of the two overlapping at several points (see Grinnell, 1908, p. 148). In the San Jacinto Mountains, *mordax* appears to be absent altogether, while *californicus* ranges up well into Boreal. This bespeaks a notable hardihood on the part of this latter species, greater than is suggested by its lower range elsewhere. It is possible that the existence of another Microtine representative in the Boreal zone elsewhere is the chief factor preventing invasion of *californicus* upward.

The San Jacinto skins of *californicus*, like those from elsewhere in extreme southern California, show a distinct mixture of reddish hairs in the dorsal pelage, giving a rusty effect as compared with *californicus* from the central portion of the state. This tendency is apparently in the direction of the character ascribed to Elliot's *Microtus c. hyperythrus*, described from northern Lower California. The peculiarity does not seem to be developed in the San Jacinto animals to a degree to merit taxonomic recognition.

Thomomys perpallidus C. H. Merriam

Palm Springs Gopher

Palm Springs, the type locality of this gopher, was visited in February, 1912, for the special purpose of obtaining an adequate series. Forty specimens were secured, nos. 16485-16524. Two other examples are in the Museum (nos. 4635, 4672), taken in the same locality in December, 1903.

The gophers were trapped only along the ditch leading down from Tahquitz Cañon to the village, and in irrigated pastures and gardens in the town itself. The animals were actively throwing up earth only where the ground was moist. In both situations there was plenty of newly growing vegetation, particularly Bermuda grass, the root-stalks of which seem to be especially sought for food. Old workings were observed on

fine-grained sandy ground away from cultivation, on the desert floor close to the base of the foothills, and up in the mouths of cañons. Fresh mounds are rarely distinguishable on the dry desert, and it is difficult to find the open burrows in the loose dry earth of the desert. No unmistakable signs of gophers were noted at all, far out on the desert floor away from the base of the mountains.

February 9 to 12 was evidently about the beginning of the breeding season. The testes of the males were enormously developed. Three females were taken containing small embryos, four, four, and three, respectively. All the rest of the females had not yet bred, save one, which had a litter of half-grown young, one of which was captured on the 11th. In no case were males and females captured in the same burrow. Each burrow appeared to be occupied by but one individual, save in the case where there were young. Out of the forty-two gophers, fourteen, or just one-third, were males. Two to one is the proportion of females to males in at least one other species of the genus (see Grinnell, 1908, p. 151). The dimensions of the comparable males have been given in another connection (Grinnell, 1912a, p. 176).

In our 1908 explorations, gopher workings were seen in the Piñon Flat and Deep Cañon country, but we failed to secure specimens, and their identity remains conjectural. *Thomomys perpalidus*, as recently restricted (Grinnell, 1912a, p. 171), is still a well-marked form; but as far as material at command goes, it is found only in the immediate vicinity of Palm Springs.

***Thomomys cabezonae* C. H. Merriam**

Cabezón Gopher

Twenty-four of the gophers taken are referred by us to this species. Sixteen of these (nos. 1248-1263) were obtained at the north base of the mountains in San Geronio Pass, 1700 feet altitude, and close to Cabezón, the type locality of *cabezónae*, and are therefore topotypes. Two others are from Snow Creek (nos. 1561-1562) at 1500 feet, six miles to the eastward. Five are from Schain's Ranch, 4900 feet (nos. 1624, 1626, 1638-1640),

the same distance due south up over the northwestern spur from the peak. And one (no. 2288) is from Vallevista, 1800 feet, down at the south base of this spur. It would appear that the species occupies the arid Upper Sonoran zone on the San Gorgonio and San Jacinto Valley sides of the mountains, possibly invading down into Lower Sonoran locally, but not as far down into that zone farther east, as at Palm Springs, where a totally different species occurs, *Thomomys perpallidus*.

The specimens of *Thomomys cabezonae* from Snow Creek and Schain's Ranch differ in no important particular from topotypes of the species. But the lone example from Vallevista, a male, young adult, is very slightly more reddish in color. Otherwise, however, it departs towards no other species. Examination of the map, and consideration of the uninterrupted and almost uniform conditions extending over the hills between Cabezon and San Jacinto, makes the continuity in range of this species between the localities represented quite probable.

In addition to the above, there are at hand three gophers (nos. 16393-16395) taken at Whitewater Ranch, which lies a mile or so north of Whitewater Station. They were obtained by Mr. H. E. Wilder, December 17, 1911, and presented by him to the Museum. These are closely similar to topotypic *cabezonae*, and indicate the occurrence of this form along the northern wall of San Gorgonio Pass, possibly invading the southern foothill region of the San Bernardino Mountains, as it does the northern foothills of the San Jacintos.

The query arises as to the relationships of *cabezonae* with the other species of gophers of the general region. Our material has been gone over with this point particularly in view, without our ascertaining anything definitely. This failure is due chiefly to lack of appropriate material from a critical series of localities.

In a very general way the material at hand seems to indicate that *cabezonae* is more nearly related to *nigricans* than to either *perpallidus* or *perpes*. It is thus possible that *cabezonae* will turn out to be a pallid, and otherwise distinguished, desert race of *nigricans*, with very much the same relative ranges and characters as *Perognathus f. pallidus* and *P. f. fallax*, and also certain other rodents.

Our ascription of the two forms of gophers to Schain's Ranch is, of course, not in harmony with this view; but our decision may well have been due to incorrect determination of the specimens concerned, which are immature; geographic intergradation between *cabezonae* and *nigricans* is not beyond possibility.

Thomomys nigricans Rhoads

Tawny Gopher

Twenty-four of the gophers taken in the San Jacinto region have, after close comparison, been referred to this form. The localities represented are Schain's Ranch, 4900 feet, four (nos. 1625, 1627, 1641, 1642); Fuller's Mill, 5900 feet, one (no. 1715); Strawberry Valley, 6000 feet, ten (nos. 2139-2148); Hemet Lake, 4400 feet, five (nos. 2233-2237); Thomas Mountain, 6800 feet, one (no. 2232); Kenworthy, 4500 feet, two (nos. 1862, 1863); and Santa Rosa Peak, 7500 feet, one (no. 1990). It will be noted that these localities lie within a vertical range of 3100 feet (4400 to 7500 feet), also that the life zone is in each case high Upper Sonoran or Transition, or better expressed, the belt of blending of these two zones. The metropolis of *Thomomys nigricans*, judging from the results of extensive field work in southern California, as represented by large suites of specimens in the Museum, is a corresponding zonal belt lying along the western slopes of the mountains of San Diego County. It is to be inferred that the range of *nigricans* here finds its northwestern limit. The San Jacinto *nigricans* are all from the Pacific slope, as are also the San Diego County series. Since specimens were taken at Schain's, where were also secured examples referred to *cabezonae*, it appears that the ranges of the two forms may overlap at least at this point. This was the only place where we found any evidence of the overlapping of the ranges of any two species of gophers, though this state of affairs is to be expected along the lines where distinct species meet. The only alternative is blending of forms through hybridization. This could be proved by the collection of gophers in a practically continuous line from one habitat into another up different sides of the mountain.

The Strawberry Valley and Hemet Lake series are to all appearances identical in color and size with topotypes of *nigricans*. Unfortunately our series does not include old males. In the females, however, the skulls are distinctly lighter, with narrower brain-case, and less squarish zygomae than in topotypes of *nigricans*. The example from Thomas Mountain is unequivocally *nigricans* like those from Hemet Lake. The two Kenworthy gophers are very young. The only specimen from Santa Rosa Mountain, is a male, young adult, satisfactorily referred to *nigricans* from both cranial and external characters. The Fuller's Mill specimen is a male, young adult; in color it strongly resembles *altivallis*, but its skull is altogether too light for that species, and together with general measurements, coincides with *nigricans*. It is to be borne in mind, too, that the color differences between *nigricans* and *altivallis* are slight. The same remarks apply to the four examples from Schain's Ranch.

The conspicuous features of *nigricans*, as represented in the San Jacinto region, are very small size (see tables), very dark reddish brown colors, and light skulls with small audital bullae.

We cannot see the logic in calling *nigricans* a subspecies of *fulvus*, as it has heretofore been considered, even granting the close similarity; for, in addition to the fact that a broad area inhabited by unrelated forms intervenes between the ranges of the two, there is the further circumstance that *nigricans* and *fulvus* occupy different life zones. These geographic considerations should be given weight in settling the status of forms. There is no continuity of range, and no intergradation possible.

All through the region including the specified localities of capture, signs of gophers were plentiful. The evident inactivity of adults after the breeding season probably accounts for our failure to secure good old examples.

LIST AND MEASUREMENTS IN MILLIMETERS OF FULL-GROWN FEMALES OF
Thomomys nigricans

Mus. No.	Sex	Locality	Total Length	Tail Vertebrae	Hind Foot
2233	♀	Hemet Lake, San Jacinto Mts.	202	71	28
2234	♀	Hemet Lake, San Jacinto Mts.	185	63	25
2235	♀	Hemet Lake, San Jacinto Mts.	206	59	27
2236	♀	Hemet Lake, San Jacinto Mts.	191	62	27
2237	♀	Hemet Lake, San Jacinto Mts.	197	55	28
2139	♀	Strawberry Valley, San Jacinto Mts.	195	63	26
2140	♀	Strawberry Valley, San Jacinto Mts.	200	70	28
2141	♀	Strawberry Valley, San Jacinto Mts.	202	58	27
2143	♀	Strawberry Valley, San Jacinto Mts.	187	66	26
2146	♀	Strawberry Valley, San Jacinto Mts.	191	68	27
2147	♀	Strawberry Valley, San Jacinto Mts.	207	68	28
2232	♀	Thomas Mt., San Jacinto Mts.	200	62	26
1625	♀	Schain's Ranch, San Jacinto Mts.	215	68	29
1627	♀	Schain's Ranch, San Jacinto Mts.	206	64	28
1642	♀	Schain's Ranch, San Jacinto Mts.	194	62	29
		Average of the 15 ♀♀	198	64	27

***Thomomys altivallis* Rhoads**

San Bernardino Mountain Gopher

The twelve specimens of gophers referred by us to this species were obtained at but two localities: Tahquitz Valley, 8000 feet, ten (nos. 2188-2197), and Round Valley, 9000 feet, two (nos. 1761, 1762). The latter is well within the Boreal zone and the former is at least high Transition. As no other gopher was obtained above low Transition, it is evident that *altivallis* is the Boreal representative of the genus on this mountain as it is on the San Bernardino range (see Grinnell, 1908, p. 150). Not one old male was secured on San Jacinto; but five females, as shown in the accompanying table, measure close to the average of San Bernardino Mountain females. In coloration both adults and young are identical with corresponding pelages in the San Bernardino series, save that there is more or less white on the throat and belly of several of the San Jacinto skins.

If our identification proves correct, *Thomomys altivallis* so far as now known exists only on the San Bernardino and San Jacinto mountains, with the deep San Gorgonio Pass separating these two colonies. Small differences may yet be found as a

result of this isolation. The nearest relative of *altivallis* appears to be *Thomomys alpinus* of the Mount Whitney region, also a boreal species. The chief appreciable differences between the two lie in the somewhat smaller size of *alpinus*, and in its slightly grayer general coloration and constantly white throat. The latter peculiarity is possessed by some examples of *altivallis* from the San Jacinto mountains, as above noted.

All of our San Jacinto specimens were trapped on or around meadows, but gopher workings were also plentiful on well-drained ridges in the vicinity, as all through the lodge-pole pine belt surrounding Round Valley.

LIST OF MEASUREMENTS IN MILLIMETERS OF FULL-GROWN FEMALES OF
Thomomys altivallis

Mus. No.	Sex	Locality	Total Length	Tail Vertebrae	Hind Foot
2188	♀	Tahquitz Valley, San Jacinto Mts.	220	71	30
2190	♀	Tahquitz Valley, San Jacinto Mts.	210	65	29
2193	♀	Tahquitz Valley, San Jacinto Mts.	230	80	30
1761	♀	Round Valley, San Jacinto Mts.	196	60	26
1762	♀	Round Valley, San Jacinto Mts.	209	69	29
		Average of the five ♀♀	213	69	29
		Average of 44 ♀♀ of <i>T. altivallis</i> from the San Bernardino Mts.	223	68	30.5

***Dipodomys merriami simiolus* Rhoads**

Allied Kangaroo Rat

Forty-six specimens of this four-toed kangaroo rat were obtained in the San Jacinto region, representing the following stations: Dos Palmos Spring, 3500 feet, ten (nos. 1920-1927, 1938, 1939); Palm Springs, 450 feet, seven (nos. 5348, 5355-5359, 6928); Whitewater, 1130 feet, twelve (nos. 1600-1605, 1612-1617); Snow Creek, 1500 feet, ten (nos. 1606-1611, 1628-1631); Cabezon, 1700 feet, seven (nos. 1315-1321).

These localities will be seen to align themselves strictly within the Lower Sonoran zone on the desert slope of the mountains. At the highest station altitudinally—Dos Palmos Spring—this rodent was associated with *Perodipus agilis*, in our experience an unusual state of affairs, though this is clearly due to the local overlapping of ranges because of the juxtaposition of the desert and coast faunas. Young had appeared in numbers, during the

latter half of May, at the several localities, the earliest noted another chapter (see pp. 388-392).

***Dipodomys merriami parvus* Rhoads**

San Bernardino Kangaroo Rat

This form was found by us only at Vallevista, 1800 feet, at the Pacific base of the mountains. Here it was represented in fair abundance in tracts of brush on the level floor of the San Jacinto Valley. Eleven specimens were secured (nos. 2258-2267, 9364), August 30 to September 3. Five of these are young-of-the-year, the remainder fully adult. All of these appear to be identical with practical topotypes of *parvus* from Cajon Wash. near San Bernardino.

Since there appears to be no adequate description of this species in literature, we offer the following account. In color, *parvus* is distinctly grayer, less ochraceous than *simiolus*; in the former the tint of the colored parts of the hairs dorsally is clay color, in the latter ochraceous buff. In *parvus* the color is much more obscured by the greater amount of dusky tipping to the hairs; this obscuration is greatest in the mid-dorsal region, leaving the sides more purely clay color. In *parvus* the dark markings generally are heavier and hence better defined; the facial markings, soles of hind feet, and tail stripes and tuft are distinctly sooty. The young of the two races show comparable differences, save that in the first pelage of *parvus* the facial markings are obsolete as in *simiolus*.

The accompanying table of measurements shows that in *parvus* and *simiolus* body length is the same, but that *parvus* has slightly shorter tail and hind foot. However, the ranges in dimensions overlap to such a degree that measurements individually have no diagnostic value. It is interesting to note that the range of variation in the size of the two forms appears to be about the same.

As to cranial characters, *parvus* has slightly the smaller skull; the audital bullae are distinctly smaller, and the brain case higher, more bulging on top. The latter two are obviously correlated characters and there are doubtless other dependent features.

MEASUREMENTS IN MILLIMETERS OF TWENTY-ONE SPECIMENS OF *Dipodomys merriami parvus* FROM THE PACIFIC DRAINAGE OF RIVERSIDE AND SAN BERNARDINO COUNTIES, CALIFORNIA

Mus. No.	Sex	Locality	Date	Total length	Tail vertebrae	Hind foot	Length of body	Ratio tail to body
2962	♂	Valley Vista, San Jacinto Valley	Sept. 3, '08	241	146	37	95	1.54
2263	♂	Valley Vista, San Jacinto Valley	Sept. 3, '08	234	140	36	94	1.49
2265	♀	Valley Vista, San Jacinto Valley	Aug. 31, '08	220	127	35	93	1.36
2266	♂	Valley Vista, San Jacinto Valley	Sept. 3, '08	240	138	33	102	1.35
2267	♂	Valley Vista, San Jacinto Valley	Sept. 3, '08	232	132	36	100	1.32
2541	♀	Cajon Wash, near San Bernardino	Oct. 2, '08	228	136	36	92	1.43
2542	♂	Cajon Wash, near San Bernardino	Oct. 2, '08	219	129	35	90	1.43
2543	♂	Cajon Wash, near San Bernardino	Oct. 2, '08	235	141	37	94	1.50
2545	♂	Cajon Wash, near San Bernardino	Oct. 4, '08	235	142	36	93	1.53
2546	♀	Cajon Wash, near San Bernardino	Oct. 5, '08	224	141	35	83	1.70
2549	♂	Cajon Wash, near San Bernardino	Oct. 2, '08	230	130	36	100	1.30
2600	♂	Reche Cañon, near Colton	July 17, '08	238	146	36	92	1.46
2601	♂	Reche Cañon, near Colton	July 22, '08	234	142	38	92	1.54
2604	♂	Reche Cañon, near Colton	July 19, '08	233	146	39	87	1.68
2606	♀	Reche Cañon, near Colton	July 22, '08	224	135	36	89	1.52
2474	♂	Seven miles southeast of Riverside	Sept. 7, '08	240	140	36	100	1.40
2470	♂	Jurupa Mts., near Riverside	Sept. 30, '08	225	138	36	87	1.59
2471	♀	Jurupa Mts., near Riverside	Oct. 6, '08	243	147	37	96	1.51
2472	♂	Jurupa Mts., near Riverside	Oct. 7, '08	225	130	37	95	1.37
2475	♂	Jurupa Mts., near Riverside	Oct. 7, '08	232	128	35	104	1.23
7144	♂	Jurupa Mts., near Riverside	Feb. 4, '09	238	132	36	106	1.24
Average of all (5♀♀ + 16♂♂)				232	137	36	95	1.45
Mean				231	137	36	94.5	1.46
Maximum				243	147	39	106	1.70
Minimum				219	127	33	83	1.23
Percent of variation on either side of mean				5	7	8	12	16

The geographical distribution of *parvus*, as indicated by the stations listed as part of the table of measurements, lies wholly west of the desert divide, and altogether within the Lower Sonoran zone of certain interior valleys hemmed in between the Santa Ana range of mountains on the southwest and the San Bernardino and San Jacinto mountains on the north and east.

MEASUREMENTS IN MILLIMETERS OF TWENTY SPECIMENS, BOTH SEXES, OF *Dipodomys merriami simiolus* FROM PALM SPRINGS, SNOW CREEK, WHITEWATER AND CABEZON, ON THE DESERT SIDE OF THE SAN JACINTO MOUNTAINS.

	Total length	Tail vertebrae	Hind foot	Length of body	Ratio tail to body
Average of all (8 ♀♀ + 12 ♂♂)	238	142	38	95	149
Mean	241	144	39	94.5	148.5
Maximum	256	157	42	102	167
Minimum	227	131	36	87	130
Per cent of variation on either side of mean	6	9	8	8	8

Dipodomys deserti deserti Stephens

Desert Kangaroo Rat

Found only at the desert base of the San Jacinto Mountains, whence the Museum contains nine specimens, three (nos. 5903, 6933, 6934) from Palm Springs, 450 feet, and six (nos. 1536-1541) from close to the railroad station at Whitewater, 1130 feet. The species belongs to the Lower Sonoran zone, and does not in this region invade levels above the sand flats of the desert floor.

Perodipus agilis agilis (Gambel)

Gambel Kangaroo Rat

Thirty specimens referable to this species were taken in the San Jacinto region, representing the following stations: Foot-hills one mile south of Banning, 2200 feet, six (nos. 1418-1423); Schain's Ranch, 4900 feet, six (nos. 1662-1667); Kenworthy, 4500 feet, sixteen (nos. 1818-1827, 1848, 1850, 1859-1861); Carrizo Creek, near Dos Palmos Spring, 3000 and 3500 feet, two (nos. 1916, 1917).

These localities are all within the Upper Sonoran zone; Banning and Dos Palmos Spring are at the extreme lower edge of this zone, where occur also many Lower Sonoran elements; Kenworthy is close to the upper limits of Upper Sonoran. It is of note that in this latter locality all of the kangaroo rats taken were from the sage-brush flat on the floor of the valley, none being found in the chaparral-covered hills on either side. One example here was found freshly caught at 5 p.m. on June 4, indicating unusual diurnal activity.

We have subjected the above-specified series to close scrutiny, both *inter se*, and in comparison with *agilis* from the Pacific slope of Los Angeles County. As far as we are able to discern, there are no good characters existing to warrant separation from *agilis*; neither can we detect differences correlated with the desert and Pacific slopes respectively. The examples from Banning are exactly like those from Kenworthy; also the two from Dos Palmos Spring are indistinguishable from specimens from Kenworthy. As in the case of certain other rodents found at Dos Palmos, the presence of *Perodipus agilis* there may be accounted for as an extreme encroachment down into the edge of the desert area of a Pacific slope form. As noted elsewhere an extraordinary mixture resulted.

***Perodipus cabezonae* C. H. Merriam**

Cabazon Kangaroo Rat

But one example of five-toed kangaroo rat was secured in the vicinity of Cabazon, the type locality of *Perodipus cabezonae*. This specimen is an adult male, no. 1322, taken May 11. It accords closely with Merriam's description. As compared with *agilis*, it is more yellow, with paler face, and hind feet with dusky instead of black soles. In size it is smaller, with especially short tail, measuring: total length 274, tail vertebrae 160, hind foot 40.

No other *Perodipus* secured by us in the San Jacinto region is referable to this form, those even from Banning, only six miles farther up through San Gorgonio Pass, being distinctly different. It is hazardous for us even to conjecture relationships and range upon such inadequate evidence, save that Cabazon is

more emphatically arid Lower Sonoran in its faunal and zonal position than any of the other stations where this genus was found.

***Perognathus panamintinus bangsi* Mearns**

Bangs Pocket-Mouse

An abundant rodent on the Lower Sonoran desert base of the San Jacinto Mountains. Represented by specimens as follows: Dos Palms Spring, 3500 feet, six (nos. 1929-1932, 9354, 9355); Whitewater, 1130 feet, five (nos. 1487, 1488, 1505-1507); Snow Creek, 1500 feet, thirty (nos. 1471-1486, 1491-1504); Cabezon, 1700 feet, twenty-nine (nos. 1356-1364, 1366-1380, 9349-9352); Banning, 2200 feet, two (nos. 1489, 1490). Two of these localities are at the upper edge of Lower Sonoran—Dos Palms and Banning. The two specimens from Banning show slightly the darkest coloration, perhaps indicating intergradation towards *brevinasus*. This idea is further substantiated by cranial characters, the Banning examples presenting shortish rostra. In neither of these features, however, is the divergence enough to warrant using the name *brevinasus* for the Banning specimens.

All the above listed examples of this pocket mouse were taken in May and June. Two weeks' trapping at Palm Springs in December and January, 1903 and 1904, produced no *Perognathus*. It is evident that this rodent experiences a period of inactivity in winter.

***Perognathus panamintinus brevinasus* Osgood**

Short-nosed Pocket Mouse

Found at but one station, Vallevista, 1800 feet, in San Jacinto Valley. Eight specimens (nos. 2278-2285) were secured there August 31 to September 5. This material shows satisfactorily the characters ascribed to the form *brevinasus*, both as to coloration and proportions of body and cranium. The locality of capture lies at the Pacific base of the mountains, and together with the other known stations of occurrence indicates a range coinciding closely with that portion of the Lower Sonoran zone lying within the San Diegan faunal district. Other localities

represented in the Museum series of this form are: Reche Cañon, near Colton; Garnsey, San Fernando Valley, Los Angeles County; near Wilmington, Los Angeles County.

***Perognathus penicillatus angustirostris* Osgood**

Colorado Desert Pocket Mouse

This species is represented in the collection by but two specimens: no. 1404, from Cabezon, 1700 feet, and no. 1622 from Snow Creek at 1500 feet altitude. This pocket mouse belongs to the low Lower Sonoran zone of the Colorado desert floor, and its relative scarcity within the San Jacinto region as above indicated probably results from our localities of capture being on the extreme margin of its range.

***Perognathus fallax fallax* C. H. Merriam**

Short-eared Pocket Mouse

We refer to this race six specimens secured at Vallevista in San Jacinto Valley (nos. 2272-2277). These were taken in September, and five of them are in fresh winter pelage, the sixth being a juvenal. While this condition of pelage probably accounts in part for their distinctly darker tone of coloration, as compared with the large series of the subspecific representative of the species *fallax* obtained in May and June on the desert base of the San Jacintos, the relative paleness of the latter as compared with the former cannot be altogether due to seasonal causes. The Vallevista specimens are identical with topotypes of *fallax* from Reche Cañon near Colton. Still, as pointed out by Mearns in his description of *P. f. pallidus* (1901, p. 135), the darkest individuals of the species come from still farther towards the coast, so that the Reche Cañon and Vallevista representatives may both be considered somewhat intergradient towards the pale extreme, *pallidus*.

Five adult specimens from Banning (nos. 1465-1469) are distinctly intermediate between *fallax* and *pallidus*, and might have been placed with equal propriety under the latter name. This again indicates that the San Jacinto region occupies a part of the area of intergradation between the coastal race *fallax* and the desert form *pallidus*.

***Perognathus fallax pallidus* Mearns**

Pallid Pocket Mouse

Our collecting showed this to be the most abundant species of coarse-haired pocket mouse around the desert base of the San Jacinto Mountains, where it was found to occupy hilly ground in high Lower Sonoran. The local range of the species may be inferred from the localities of capture, namely: Dos Palmos Spring, 3000 to 3500 feet, twenty-six specimens (nos. 1968-1989, 9360-9363); Palm Cañon at 3000 feet, six specimens (nos. 2059-2061, 2064, 9358, 9359); Palm Cañon near mouth at 800 feet, two (nos. 2062, 2063); Snow Creek, 1500 feet, thirteen (1589-1597, 1618-1621); Cabezon, 1700 feet, twenty-six (nos. 1365, 1381-1403, 9356, 9357).

As remarked under *P. f. fallax*, our small series from Banning, well up towards the top of San Geronimo Pass, are intermediate towards *fallax*. This is to a perceptible degree also true of some examples from Dos Palmos Spring. In other words, the Snow Creek and Cabezon series are palest; only these justify the employment of a separate name.

***Perognathus californicus femoralis* Allen**

Dulzura Pocket Mouse

Fifteen pocket mice of this species were obtained in the San Jacinto region, eleven (nos. 1651-1661) from Schain's Ranch, 4900 feet, and four (nos. 2118-2121) from Strawberry Valley, 6000 feet. An additional specimen, believed to be of the same species, was trapped at Hemet Lake, 4400 feet, but was destroyed. All of these localities are close to the line of blending of the Upper Sonoran with the Transition zone. In consideration of the localities of known occurrence in San Diego County (Dulzura, Santa Ysabel, Fair Oaks, Witch Creek, Foster, and Warner Pass) this subspecies belongs clearly to high Upper Sonoran.

In our efforts to ascertain the status of this rodent, we were led to enquire into the relationships existing between the various pocket mice of the *californicus* group. The results of our study fail to coincide with the conclusions formulated in the last monograph of the genus (Osgood, 1900, pp. 57-59). The material

at hand consists of 159 skins with skulls of the *californicus* group from within the state, all catalogued in the Museum of Vertebrate Zoology. These are representative of the following localities: San Mateo County: Redwood City, Portola, and Corte Madera Creek; Santa Clara County: Black Mountain; Monterey County: Monterey and Salinas Valley; San Luis Obispo County: Santa Margarita; San Joaquin County: 8 miles southwest of Tracy; Merced County: 22 miles southwest of Los Banos; Madera County: Raymond; Kern County: Piute Mts., Walker Pass, Weldon, Onyx, Bodfish and Fay Creek; Tulare County: Trout Creek and Jordan Hot Springs; Ventura County: Matilija, Cuddy Cañon; Los Angeles County: Pasadena, Azusa, Glendora; San Bernardino County: Upper Santa Ana River, San Bernardino Mountains; Riverside County: San Jacinto Mountains; San Diego County: Warner Pass, Julian, Witch Creek, Cuyamaca Mountains, Foster.

Each of the characters used by Osgood in diagnosing the species concerned was tested by us with the following results:

(1) Coloration.—We find that in all of the forms, as far as indicated by available material, the fresh fall pelage is much darker, with more of the black hair-tipping, than the spring coat. Taking this fact into account, the coloration of the pocket mice from San Mateo County all the way to southern San Diego County is uniform. This coastal range includes the habitats of *californicus*, *dispar* and *femoralis*. In the original description of *dispar* (Osgood, 1900, p. 59) paleness of color was one of the emphasized characters. In the light of our material and the evident seasonal change, the character falls. There is, however, a significant paleness attaching to our specimens from the Kern River region. Here then in the arid interior, color does prove diagnostic, and serves to give basis for the recognition of a separate race, *P. c. ochrus* (Osgood, 1904, p. 128).

(2) Quality of pelage.—No appreciable subspecific variation detected by us.

(3) General size.—In the accompanying table of measurements, which takes account only of old adult perfect specimens, it is to be observed that there is no important modification in size southward from the San Francisco Bay region, until the

San Bernardino and San Jacinto Mountain region is reached. From those points south through San Diego County, there is a distinct increase. The matter of size, therefore, fails to argue for a race *dispar*; but it is usable as a fairly good average character for the distinguishing of a form in extreme southern California. It is of further note, however, that even then, the wide range in individual variation destroys the usefulness of this as a specific criterion in a number of individual instances. For example a male from San Mateo County (no. 3862) measures, length 211 mm., tail 120, hind foot 27, this being coincident with the *largest* of the specimens from Witch Creek, San Diego County (male no. 2983).

(4) Cranial features.—As with general size of body there is a slight increase in cranial mass in the series from extreme southern California. But we are unable to discern proportional differences anywhere. The features mentioned by Osgood in this connection are: size of mastoids, degree of arching of cranium, mastoid width, interorbital width, width of nasals and degree of emargination of fronto-nasal sutures. In all these respects there is much individual variation but none that is clearly correlated with geographic areas.

To summarize, there is not, from our material, warrant for recognition of a race *dispar* as distinct from *californicus*. This possibility was anticipated by Osgood (1904, p. 128) in his remarks when describing *ochrus*, where he says: "*P. c. dispar* is itself slightly paler than *californicus*, but the principal reason for recognizing it is its larger size and cranial characters. Should these cranial characters prove inconstant on the acquisition of larger series of true *californicus*, *dispar* would fall as a synonym of *californicus*."

As a further conclusion there now appears no justification for considering *femoralis* as of more than subspecific status, its relationship to be best expressed in the trinomial, *Perognathus californicus femoralis*. The main, if not the only, character of this race as compared with *californicus* is its large size, particularly of hind foot and ear. By our study, the range of the formerly recognized *dispar* becomes divided between that of *californicus* and that of *femoralis*, the range of the latter being

TABLE TO SHOW VARIATION IN SIZE OF RACES OF *Perognathus californicus*

Num- ber of spec- imens	Area represented	Measurements in millimeters											
		Total length			Tail vertebrae			Hind foot			Ear*		
		Average	Maxi- mum	Mini- mum	Average	Maxi- mum	Mini- mum	Average	Maxi- mum	Mini- mum	Average	Maxi- mum	Mini- mum
13	Santa Clara, San Mateo, San Joaquin, and Merced counties	202	219	192	111.3	120	101	25.5	27	25
13	Santa Margarita, San Luis Obispo County	196.3	207	185	105.8	117	96	25.5	27	24	9.3	10	8
15	Near Pasadena, Los Angeles Co.	202	217	187	115	127	100	26	27	25
5	Near Azusa, Los Angeles County	199	221	185	112	124	100	26	27	25
8	Santa Ana River, San Bernardino Mts.	211	230	193	119	134	103	27	28	25
6	Schlain's Ranch, San Jacinto Mts.	215	227	203	124	130	118	27.3	29	26
5	Warner Pass, San Diego County	216	227	200	133	143	121	27	28	26	12	13	11
3	Witch Creek, San Diego County	206	211	201	113	120	108	27	27	27	12	12	12

* Only field measurements are here used; unfortunately they were not taken in those series where this space is left blank; but general ap-
pearances point toward close correlation with hind foot.

extended to include the San Jacinto and San Bernardino mountain regions. It is only fair to state that Stephens (1906, p. 173) argued a similar disposition of the ease.

***Perognathus spinatus spinatus* C. H. Merriam**

Spiny Pocket Mouse

But a single example of this species resulted from our collecting in the San Jacinto region: an adult male, no. 2006, trapped August 23 at 3000 feet altitude near Dos Palmos Spring on the desert slope of the Santa Rosa Mountains. The locality of capture was in high Lower Sonoran close to a rocky escarpment—just such a locality as is inhabited by this pocket mouse elsewhere. Our present record affords an extreme southwestern station for the species.

***Lepus californicus deserticola* Mearns**

Colorado Desert Jack Rabbit

Jack rabbits were preserved from the following localities in the San Jacinto region: Kenworthy, 4500 feet, four (nos. 1899, 1900, 2312, 2313); Cabezon, 1700 feet, one (no. 2311); Whitewater, 1130 feet, one (no. 1568); and Palm Springs, 450 feet, one (no. 7040); seven in all. They are all typical examples of *deserticola*, except that the Kenworthy specimens in their slightly darker coloration, tend to approach the coast form *bennetti* (see Nelson, 1909, p. 136).

The species was observed, sometimes in fair abundance, at many points where specimens were not preserved. At Kenworthy, in May and June, and near Hemet Lake in August, one or two were seen almost daily in the sagebrush of the valley. At Dos Palmos in June and in August, they were scattered in small numbers through the brush, as was also the case in the very similar region throughout the lower part of Palm Cañon, and on the floor of the desert below. Noted in fair abundance at Cabezon and Whitewater in May. At Vallevista, August 29 to September 5, jack rabbits were very abundant in the brush of the valley. Nelson (1909, p. 140) records the species from Strawberry Valley, a point where we failed to meet with it, though evidence of the presence of the animal was observed.

The relatively well developed powers of locomotion of this rodent, even though a species primarily of the lowest zone at the arid base, might be held to account for its invasion Pacificwards with its pallid coloration scarcely altered at the farthest station on the more humid side of the mountains. It would appear that the index of dispersal of the desert race *deserticola* is in this region greater than that of the Pacific coast race *bennetti*. As a result characters of desert origin are carried well over upon faunal ground more properly belonging to the darker coast race.

***Sylvilagus auduboni arizonae* (Allen)**

Arizona Cottontail

Judging from the results of our collecting, cottontails would seem to be rather uncommon along the desert base of the San Jacinto Mountains. But one specimen was taken, at Banning, 2200 feet (no. 1470); the species was noted at Cabezon, but none were collected there. There is also a skin from Palm Springs, 450 feet (no. 7036) taken December 31, 1903.

Nelson (1909, p. 220) has referred a specimen from Banning to *S. a. sanctidiegi*, but while our single example is evidently intermediate between that form and *arizonae*, its extremely pale coloration seems to justify its inclusion under the latter. The skull is small, and not noticeably different from those of San Diego specimens.

Evidently the eastern slope of San Gorgonio Pass is with these rabbits, as with several other species of mammals, a region of transition between pallid desert and darker coast forms.

The Palm Springs example, in winter pelage, is darker colored than summer skins of *arizonae* and with little buffy coloration anywhere, but it is distinctly grayish as compared with the richer-colored *sanctidiegi*. The large audital bullae also place it with the desert race.

***Sylvilagus auduboni sanctidiegi* (Miller)**

San Diego Cottontail

Two rabbits taken at Vallevista, 1800 feet, on August 30 and September 4, respectively (nos. 2286, 2287), are evidently

referable to this coast form. Neither in coloration, proportions, nor characters of cranium can they be distinguished from specimens of *S. a. sanctidiegi* from western San Diego County.

Vallevista was the only point where this subspecies was with certainty recognized. Here the rabbits were exceedingly abundant, in the brush-covered washes and on the mesas at the base of the hills.

In the San Jacinto region the rabbits of the *Sylvilagus auduboni* group, represented by the subspecies *sanctidiegi* and *arizonae*, on the coast and desert sides, respectively, appear to be restricted to the Lower Sonoran zone at the base of the mountains, and probably occur nearly continuously around the range, though not uniformly abundant at all apparently suitable spots. Higher up, in the Upper Sonoran zone, the cottontail seems to be entirely replaced by the brush rabbit, *S. bachmani cinerascens*.

***Sylvilagus bachmani cinerascens* (Allen)**

Ashy Brush Rabbit

Eight specimens collected, as follows: Kenworthy, 4500 feet, three (nos. 1901–1903); Dos Palms Spring, 3500 feet, four (nos. 1904–1906, 2308); Thomas Mountain, 6800 feet, one (no. 2229). Indications of the presence of the species were observed in the vicinity of the Garnet Queen Mine, on Santa Rosa Mountain, 6000 feet, where plentiful sign was noted in the greasewood along the road, at the extreme upper edge of the chaparral belt.

It seems probable that notebook records of “cottontails” seen at Schain’s Ranch, 4900 feet, and Poppet Flat, 4000 feet, really pertain to this species. Several were seen at these points June 27 and July 15, but none taken, and as specimens of *S. a. sanctidiegi* were not secured elsewhere in the mountains at this altitude, there is little doubt but that *S. b. cinerascens* was the species observed.

At no point were many brush rabbits seen, a fact possibly due more to the timid and retiring disposition of the animal, and to the nature of its habitat, than to its actual scarcity. At Kenworthy during May and June they were seen from time to time, usually in the early morning or late afternoon, and invari-

ably in the dense brush at the base of the surrounding hills. About Dos Palmos, in June, and again in August, they were occasionally jumped from their hiding places in the bushes, on the more brushy portions of the mesa. Here they were in typically desert surroundings, in our experience a most unusual environment for the species, and due, apparently, to their downward dispersion from the nearby Upper Sonoran hills.

The one secured on Thomas Mountain, the only one seen at this point, is from an altitude (6800 feet) perhaps as high as any previously published record station. Nelson (1909, p. 252) states that in northern Lower California the species ranges up to 6000 feet, into Transition. The limited area of Transition zone along the ridge of Thomas Mountain, open forests of yellow pine inhabited by many Transition zone birds, was invaded at numerous points by tongues of dense Upper Sonoran chaparral, and it was doubtless this feature that carried the brush rabbit as high as the ridge of this mountain.

Nelson's remarks (1909, p. 253) on examples of *S. b. cinerascens* from Dulzura, San Diego, and other points along the Mexican boundary, also apply in part to our San Jacinto Mountain specimens. With the color of typical *cinerascens*, the ears of some are distinctly longer than those of specimens from Pasadena and San Fernando. Measurements (ear from notch, in dried skin) in the eight specimens at hand are, average 58.8 mm., extremes 54 to 62. The bullae, however, are not appreciably different in the two series.

***Felis oregonensis oregonensis* Rafinesque**

Pacific Cougar

Well known to the inhabitants of the region. Reported as having recently occurred near Schain's Ranch, on the Strawberry Creek grade and near Hemet Peak, all being localities within the chaparral belt. No specimens were obtained, though individuals were twice encountered by one member of our party, and one was shot at but without result.

This incident occurred on May 27 on the desert slope of the Santa Rosa Mountains at the edge of Deep Cañon close to Black Hill, 3000 feet altitude. The hunter was skirting the rim of

the cañon peering cautiously over each ridge and scrutinizing the landscape for sheep, when the animal was descried bounding down a ravine leading into the cañon. At the first shot the beast stopped short and crouched; at the second it sped on and out of sight down the gorge. On June 1, possibly the same lion or its mate was seen at a distance in almost the same place. This time the animal was executing apparently useless maneuvers across a levelish area sparsely covered with brush. It bounded sinuously across and back again, and in movement and attitudes reminded the observer of the capers of a cat leaping through and over tall grass.

Subsequently the bushes which the animal had hurdled were found to be four feet high; some, more. Lion tracks were seen in the vicinity, where the nature of the ground permitted, and it was presumed that there was a den somewhere down the gorge. Sheep sign was plentiful all about; in fact a band of twelve were jumped from the side of the identical ravine where the first lion was shot at, on the following day, May 28. It is not improbable that the association was voluntary, on the part of the felines.

***Lynx eremicus californicus* Mearns**

California Wild Cat

Reported by local residents from various parts of the region. Three specimens were captured by us: no. 2333, male, Carrizo Creek, 3000 feet, June 20; no. 2335, male, Strawberry Valley, 6000 feet, July 18; No. 2334, male, Tahquitz Valley, 8000 feet, July 26. It is probable that wild cats range all over the mountain and that but one form is represented. Still, the skin from Carrizo Creek, on the desert slope, is so startlingly paler colored than the other two that there might seem good grounds for suspecting the existence of a desert and of a Pacific slope race.

It is evident, however, that the Carrizo Creek animal is considerably more worn: the pelage is more ragged and not so heavy; the tone of color may have been affected, as is believed to be the case in plumage, by the dryer atmosphere and intense light, granting that cats are here abroad in daylight, as they are known to be elsewhere.

***Canis ochropus ochropus* Eschscholtz**

California Coyote

Five specimens of coyotes were obtained as follows: Adult female, no. 2303, at Cabezon, May 8; juvenal female, no. 4397, at Banning, June 8; immature male, no. 2317, at Hemet Lake, August 10; and juvenal male and female, nos. 2314, 2315, at Dos Palmos Spring, May 30.

This material is wholly inadequate for specific determination in so difficult a group, especially in view of the intermediate location of the San Jacinto region. The single adult is in worn and faded pelage; its skull shows characters more nearly of *C. ochropus* than *C. estor*, and this in spite of the locality of capture being at the desert base of the mountains where the latter species would be most likely to occur. The example from Hemet Lake is acquiring clean fall pelage and the colors are more deeply fulvous, as in other examples from the San Diegan district. It is not improbable that all the San Jacinto specimens belong to the small-sized form inhabiting the San Diegan district, but whether or not such a form is to be properly included under the name *ochropus*, or provided with a separate name, has not been determined.

Coyotes, or signs of them, were noted as follows: In the vicinity of Dos Palmos Spring, several adults were seen, singly; and on May 30 four youngsters were discovered on a sand wash near the mouth of a deep ravine heading among some rocky hills. Two of the animals were playing together, tumbling about and biting one another like puppy dogs. As soon as alarmed they all scurried for the ravine, one whining like a scared pup. The sand flat was plentifully sprinkled with their footprints for at least two acres, showing that it had served for some time as their playground. These youngsters were abroad thus in the open, late in the forenoon. No adults were seen at the time.

Coyotes were heard howling nightly around Kenworthy. Sign was seen on Thomas Mountain, 6800 feet, the highest place of observed occurrence of this mammal in the region. One was seen in Strawberry Valley, 6000 feet, July 15.

The stomach of the coyote trapped at Hemet Lake, August 10, contained manzanita berries and bones and fur of small

rodents. Judging from their nocturnal yelping, coyotes were abundant in the vicinity of Vallevista, as also around Cabezon. One was seen from the train between Whitewater and Banning, at noon, June 7.

***Vulpes macrotis arsipus* Elliot**

Mohave Desert Kit Fox

One specimen is in the Museum, obtained on the floor of the desert close to Palm Springs, 450 feet, December 26, 1903. This is an adult male, no. 7091; it resembles closely other examples from the Mohave desert and Colorado River valley. It measures: length 750 mm., tail vertebrae 287, hind foot 123, ear from inner base (in dried skin) 72.

***Urocyon cinereoargenteus californicus* Mearns**

California Gray Fox

***Urocyon cinereoargenteus scotti* Mearns**

Arizona Gray Fox

Foxes proved to be numerous in the San Jacinto region. While this carnivore undoubtedly ranged all over the mountains from the lowest to the highest altitudes, our experience pointed towards the center of its abundance being in the Upper Sonoran chaparral association.

The following facts in regard to food were obtained. The stomach of a fox trapped in Palm Cañon, June 16, contained some juniper berries and fragments of juniper twigs, a number of pieces of skin and bones of lizards, and some rabbit hair. All through the Piñon Flat and Upper Palm Cañon region, feces of foxes were plentifully observed, and consisted largely of the hard seeds of the California juniper. The fruit of this shrub thus appeared to form an important proportion of foxes' food.

Fifteen specimens of the gray fox were secured as follows, adults unless otherwise specified: Schain's Ranch, 4900 feet, female, no. 2708 (skull only); Tahquitz Valley, 8000 feet, July 23, male, no. 2328 (both skin and skull although catalogued are

not now to be found); Thomas Mountain, 6800 feet, August 18-20, four: nos. 2324 male, 2325 female, 2326 female, 2327 female immature; Kenworthy, 4500 feet, May 24, female, no. 2330; Santa Rosa Peak, 7500 feet, June 30, female, no. 2331; Carrizo Creek, in vicinity of Black Hill, 3000 feet, three: male, no. 2332, May 26, female, no. 2318, June 22 (skull now missing), male, no. 2329, August 24; Palm Cañon, 800 feet, June 16, female, no. 2316; Palm Springs, 450 feet, December 23, 1903, female, no. 7094; Snow Creek, 1500 feet, June 2 (skull only, not sexed) no. 7795; Cabezon, 1700 feet, May 8, male, no. 2304.

Two well-marked subspecies of the gray fox inhabit southern California, one occupying the San Diegan district (*U. c. californicus*), the other the Colorado desert (*U. c. scotti*). Of the latter the Museum contains a series of nine specimens; and there is also an adequate series of *californicus* from the Pacific slope of southern California.

The Colorado River series (*scotti*) shows the following characters as compared with *californicus*: Coloration paler, less brightly rufous, and white endings of hairs on sides of body and tail, and on top of head, more extensive on each hair, resulting in a more silvery gray general effect. The skull is relatively more slender, the teeth slenderer and sharper; bullae more inflated; that is, relatively higher and steeper-sided; rostrum conspicuously narrower, possibly correlated with the weaker teeth.

The San Jacinto series of foxes, as we have found to be the case with so many other mammals, notably the white-footed wood rats, presents a condition of varied intermediateness, and includes also certain examples which are quite satisfactorily referable to one form or the other. As is to be expected on geographical grounds the good *scotti* are from the desert side, good *californicus* from the highest zones and the Pacific side.

Unfortunately for color characters nearly all the San Jacinto skins are in very worn and more or less faded summer pelage. As in the case of the wildcats, the foxes from the arid side of the range had suffered much more in these respects than those from the Transition zone and Pacific side. August examples from Thomas Mountain are in good enough pelage to warrant certain diagnosis as *californicus*. Our one winter skin, from Palm

Springs, is, in its pale and conspicuously silvery hue, unequivocally *scotti*. In February, 1912, the senior author saw at Palm Springs five skins of foxes recently trapped at the rocky base of the foothills close by; these, also, were readily recognizable as the pale *scotti*, rather than *californicus*.

The skulls furnish the best basis for determining individuals. Those from Palm Springs and Carrizo Creek are very close to the average of *scotti*. One from Cabezon, however, and another from Palm Cañon, although also on the desert side, are much more nearly *californicus*. The relative inflation of the audital bullae is a particular feature of uneven variation, and on this character alone segregation by locality shows no geographical orderliness. In other words there is no regularly progressive change in the character from point to point in a direct line from one faunal area into the other.

Again, as with the *desertorum* group of wood rats, the foxes of the San Jacinto region appear to show the results of continued interbreeding of two low-zone races of animals whose habitats here abut. The line of faunal mergence is so narrow that there is no room for gradual blending as is usually exhibited between races when the faunal transition occupies a much wider extent of country (as compared with the powers of locomotion of the species concerned). Instead, the intermediates are heterogeneous in their exhibition of characters, and are thus more in the nature of hybrids than geographic intergrades, if each term be used in the sense in which it is commonly employed in systematic mammalogy. In the San Jacinto foxes it is clearly just as much geographic intergrading in a real sense as if all the animals from any one point along a line from one habitat to the other were uniform, and as if similar representations from the series of points aligned themselves in even gradation from one extreme to the other, instead of there being a conspicuous irregularity in all respects, as is the case.

Salient facts are: the Colorado River series and a series from the coast district of California are each uniform within narrow limits of individual variation; the San Jacinto series is widely variable, including extremes referable to each subspecies and examples showing various combinations of characters.

It is unfortunate that the name *californicus* was based on a type from the San Jacinto region (Mearns, 1897, p. 459). Said type is very likely not to have represented the best manifestation of the subspecies inhabiting the San Diegan faunal area. In other words the type was probably not typical of the race to which the name *californicus* is held to apply. Such a circumstance is common in the early history of the systematic mammalogy of any country.

***Procyon psora psora* Gray**

California Coon

No specimens were procured; but fresh footprints were seen along the creek in Strawberry Valley, 6000 feet, July 9; and we were assured of the occurrence of coons around Hemet Lake, 4400 feet. Both these localities are on the Pacific drainage.

[*Ursus horribilis californicus* Merriam

California Grizzly

It is many years since bears have been seen in these mountains. The California grizzly was formerly abundant, so much so as to be a constant menace to the cattle belonging to the first settlers in the mountain valleys, and the bears were consequently shot, trapped, and poisoned upon every occasion, to their extinction, which took place in this range about 1890. A few old log bear traps may still be seen in the brushy hills bordering Thomas and Coahuila valleys.

The above statement is made chiefly upon the authority of H. E. Wilder.]

***Mephitis occidentalis holzneri* Mearns**

Southern California Striped Skunk

Fifteen specimens of this skunk were trapped, and preserved either as skins with skulls or skulls only. The localities and Museum numbers are as follows: Thomas Mountain, 6800 feet, one (no. 2323); Hemet Lake, 4400 feet, two (nos. 2321, 2322); Strawberry Valley, 6000 feet, two (nos. 2249, 2250); Schain's Ranch, 4900 feet, five (nos. 1623, 8864-8867); Cabezon, 1700

feet, three (nos. 2305, 2306, 7796); Snow Creek, 1500 feet, two (nos. 2307, 8863). In February, 1912, a skin of one was seen at Palm Springs, caught recently at the base of the foothills near there. It will be observed that these stations are chiefly within the Upper Sonoran zone, though the species ranges a little above and a little below. This is wholly in accord with the preferences of *Mephitis* elsewhere in southern California.

Stomach examination showed in one case bones and fur of a *Microtus*; in another case berries and leaves of manzanita together with bones and fur of an unrecognizable species of small mammal; in a third case the stomach was filled to distention with "Jerusalem" crickets (*Stenopelmatus*), while there were fragments of legs and other hard parts of these insects in the feces. A remarkably varied diet is thus indicated.

***Spilogale phenax phenax* C. H. Merriam**

California Spotted Skunk

Specimens secured as follows: adult male, no. 1898, Kenworthy, 4500 feet, May 24; young male, no. 1907, Carrizo Creek, 3000 feet, June 22; adult male, no. 2302, Cabezon, 1700 feet, May 11. These localities range from high Upper Sonoran down well into Lower Sonoran—the usual zonal range of the species elsewhere in southern California.

***Mustela arizonensis* (Mearns)**

Mountain Weasel

A single specimen was captured in Tahquitz Valley, 8000 feet, July 23. It was caught in a gopher trap, of the box pattern, open at one end, with heavy spring released merely by the animal's pushing against the trigger. This trap had been set in the meadow sod in the usual way for gophers, and the fact that it produced a weasel gives insight into the forage methods of the carnivore. One other instance of the presence of weasels in the region came to our attention: A skin of one was seen in the possession of a cattle man at Fuller's Mill, 5900 feet, July 2; it had been caught in the near vicinity a few days previously.

Our one specimen (male, no. 2167) probably represents the form occupying the San Jacinto region above the Sonoran zone. Its features in comparison with *arizonensis* from northern Nevada, have been commented upon at length by Taylor (1911, p. 299). We now have for comparison four summer adults from the Mount Whitney region of the extreme southern Sierra Nevada. The San Jacinto animal is closely similar to these, but slightly paler, especially in the brownness of the head, and is somewhat smaller. It measures, length 328 mm., tail vertebrae 113, hind foot 37.

There is very great variation among all the California specimens of this species in extent of facial white markings; for instance, one example (no. 16272, female, Monache Meadows, 8000 feet, Tulare County) has as much white on the cheeks and between the eyes as the extreme of *Mustela xanthogenys*. It does not appear that good characters are to be sought in this direction, but rather in size, proportions, and general tone of coloration.

C. H. Merriam (1896, p. 25) has suggested that *M. xanthogenys* seems to grade into *arizonensis* up the mountains. If this be true (though not shown by our rather limited material) then *arizonensis* of San Jacinto Peak might be considered nearest related to *xanthogenys* of the adjacent lowlands of southern California—in fact merely a mountain form directly derived from that species, and not to be thought of as an isolated colony of a species having its nearest relative on the high southern Sierras. The same material lends itself equally to the two theories. Because of parallel distribution among other mammals of the two regions in question, however, we lean to the latter notion.

San Jacinto Peak is the southernmost station for *arizonensis* in California.

***Sorex ornatus* C. H. Merriam**

Adorned Shrew

Found only in Strawberry Valley, 6000 feet, and Tahquitz Valley, 8000 feet. Four specimens were trapped (nos. 2090, 2149–2151), the first in the former locality, July 18, and the last three in the later locality July 20, 25 and August 1. All are adults in summer pelage, and fairly typical of *ornatus*.

In each case the capture of a shrew was a wholly fortuitous event. When special pains were taken in setting and baiting, with shrews particularly in view, nothing resulted. All the shrews were trapped in mouse traps baited with rolled oats. In one case the victim was clipped over the rump backwards, showing that it had been merely running over the trap.

The specimen from Strawberry Valley was caught beneath an overhanging mat of roots four inches from running water, the whole place over-shadowed by alders. In Tahquitz Valley the shrews were caught beneath willows and veratrum plants on and around the meadows.

As far as shown by our collecting, this species in this region belongs to the riparian association of the Transition zone.

***Notiosorex crawfordi* Baird**

Desert Shrew

A single specimen secured (no. 1928) near Dos Palmos Spring, 3500 feet, May 31. This was caught in a mouse trap set on the bare sandy ground of a broad mesa among yuccas and cactus (see pl. 10, fig. 1). The trap was baited with rolled oats; but the fact that a grasshopper was found crushed in the trap along with the shrew makes it likely that first the insect was attracted by the oats, thus constituting itself a "live bait" which in turn attracted the shrew.

Other mammals found in the same line of traps the same morning were *Perodipus*, *Dipodomys*, two species of *Perognathus*, a *Peromyscus*, a *Neotoma*, and an antelope chipmunk—a most incongruous assemblage! The shrew was not nearer than 150 yards to the nearest portion of the watercourse.

The specimen is a fully adult female in molt, the pelage dorsally being patchy, plumbeous and dull brownish. The measurements are: length 82 mm., tail vertebrae 28, hind foot 10. The mammae were large, evidently functioning.

***Scapanus latimanus occultus* Grinnell and Swarth**

Southern California Mole

Signs of moles came to notice very generally over the San Jacinto and Santa Rosa mountains. Surface runways were seen

in Tahquitz Valley and on the trail leading from there to Round Valley; also on the summit of Santa Rosa Peak and around Hemet Lake. The lowest points at which evidences of their presence were noted were on the desert slopes and base of the mountains, at Banning and Snow Creek, the elevation of the latter point being 1500 feet. These may be considered extreme eastward stations for the species, as moles are unknown from the desert proper beyond.

But two examples were procured in the region under consideration: female, no. 2089, in Strawberry Valley, 6000 feet, July 15, and a female, no. 2231, on Thomas Mountain, 6800 feet, August 19. The first was captured as a result of the collector's seeing a slight movement of the earth at the end of a mole ridge, the animal being impaled by a quick thrust of a pronged instrument. The second was caught in a special mole trap.

For the use of the name *occultus* for the mole of southern California, see Grinnell and Swarth (1912a, p. 131).

***Corynorhinus macrotis pallescens* Miller**

Pallid Big-eared Bat

Found only in a mine tunnel at about 6500 feet altitude, on the south face of Hemet Peak, and about two miles from Kenworthy. The hillside upon which the tunnel opened was Upper Sonoran, but temperature conditions where the bats were roosting were certainly altogether different from those outside, both day and night. The tunnel was 600 feet long with a vertical shaft at the end admitting air from above. A strong and, even at midday, very cold draft descended the shaft and thence flowed out through the tunnel.

The bats were found by means of candle light, clinging singly to the side walls of the tunnel, from within a few feet of the entrance nearly to the end. Here seventeen *Corynorhinus*, the only species of bat found in this locality, were obtained, on May 22 and June 5, twelve being preserved as skins with skulls (nos. 1882-1893) and five as alcoholics (nos. 9365-9369). There were fifteen males and two females; one of the latter containing a single large foetus.

On both dates all the bats when found were cold to the touch, and were apparently numb, being incapable of any but very slow movements. Within a few minutes, however, after being taken into the outside warmth, they became very active and squeaked gratingly. A curious position was that occupied by the ears when the bats were at roost. Although this was a species with relatively enormous ears, these structures were scarcely visible when the animals as first found hung against the rock surfaces head down. Upon close examination, the ears of the inverted pendant bat were found to be folded against the sides close to the body and almost completely hidden by the wings, which were held together in front, that is, against the rock. This means that the pinna was actually bent over sharply, a number of wrinkles resulting, but apparently in no degree incapacitating the conch from springing back into its wonted posture when released.

***Myotis lucifugus longicrus* (True)**

Long-legged Bat

A female adult (no. 1306) from Cabezon, 1700 feet, May 13. This occurrence is low, zonally, for the species, but the early date may indicate a migrant. Three adult females (nos. 2041–2043), Santa Rosa Peak at 7500 feet, June 30. These were obtained in the vicinity of a spring, at late dusk, where they came to drink. There was a series of pools in the rocky bed of a steep ravine. These provided an open approach from down the cañon, a bat flying directly to a pool, dipping to the surface of the water and hovering for an instant, leaving a slight ripple. One was caught in a butterfly net as it dipped to drink, the others were shot above open ground below the pools. One of the bats contained a foetus.

This species is usually found in summer in the mountains of southern California, in the Transition zone. The station on Santa Rosa Peak was in this zone.

***Myotis yumanensis yumanensis* (H. Allen)**

Yuma Bat

Taken by us but once: male adult (no. 9374), Hemet Lake, 4400 feet, August 20; caught in a bunk house. This specimen

is preserved as an alcoholic, but the skull has been removed and cleaned.

***Myotis orinomus* Elliot**

La Grulla Brown Bat

Five specimens secured: nos. 2044-2047, at Garnet Queen Mine, 6000 feet, June 25 and 26; no. 2248, Hemet Lake, 4400 feet, August 9. Both localities are in high Upper Sonoran on the Pacific Slope; in both places some transition elements were present, and it is possible though not probable that this bat belongs to Transition.

Upon the basis of our San Jacinto material, this species was first credited to the mammal fauna of the state (see Grinnell and Swarth, 1912b, p. 137).

***Myotis californicus californicus* (Audubon and Bachman)**

California Little Brown Bat

Small bats were observed at several of the stations on the Pacific side of the mountains. Our inability to distinguish the species of *Myotis* out of hand necessitates the ignoring of all occurrences except where specimens were actually obtained.

Of *californicus* only two examples were taken: adult male (no. 1894), Kenworthy, 4500 feet, June 8; female juvenal (no. 2707), Schain's Ranch, 4900 feet, July 14. Both of these localities are at the extreme upper edge of Upper Sonoran.

***Eptesicus fuscus fuscus* (Beauvois)**

Big Brown Bat

Bats of this species were obtained as follows: Kenworthy, 4500 feet, May 24 and June 5, four (nos. 1864-1867); Tahquitz Valley, 8000 feet, July 22, two (nos. 2152, 2153); Hemet Lake, 4400 feet, August 13 and 14, two (nos. 2246, 2247); Lower Palm Cañon, 800 feet, June 16, one (no. 9375). As elsewhere in southern California this bat is most numerous in the high Upper Sonoran and Transition zones, ranging highest of any member of the order. Yet it was also found well down into Lower Sonoran, though only along cañons down which individuals may fly nightly from roosting places higher up. Large bats presumed

to be of this species were seen at almost every station, so that taking into account the localities of fair certainty together with those of actual capture, a greater zonal and faunal range is indicated for *Eptesicus* than for any other bat of the region.

The specimens taken show much variation in color, and the remarks made in regard to a series from the San Bernardino Mountains apply here (see Grinnell, 1908, p. 159).

***Pipistrellus hesperus hesperus* (H. Allen)**

Western Bat

Eleven specimens were preserved as follows: vicinity of Dos Palmos Spring, 3000 to 3500 feet, May 28 and August 25, six (nos. 1895-1897, 1918, 1919, 9373); Palm Cañon, June 13 and 16, three (nos. 9370-9372); Cabezon, 1700 feet, May 7, one (no. 1307); Banning, 2100 feet, June 9, one (no. 1462). There is also in the Museum a skin (no. 6938) taken at Palm Springs, 450 feet, December 29, 1903; this was shot at dusk as it flew overhead above a patch of mesquites. Several were seen in flight at early dusk in the same locality, February 9 and 13, 1912. The occurrence of the species abroad in midwinter is of interest, as we have no evidence otherwise as to whether or not the species is migratory.

This small bat was identified with certainty only on the desert side of the San Jacinto Mountains, and, as shown above, appeared to be restricted to the Lower Sonoran zone. Very many appeared at early dusk along Palm Cañon and in the neighborhood of Dos Palmos Spring, where they were seen to emerge from crevices of rocks. This was the only species of bat seen abroad after sunrise and before sunset; in fact one individual was seen in flight about 9 A.M. in the bright glare of the forenoon sun.

BOREAL FAUNA OF SAN JACINTO PEAK COMPARED
WITH THAT OF OTHER MOUNTAINS OF
SOUTHERN CALIFORNIA

Although the Boreal zone of the San Jacinto area is sharply cut off on all sides, and is thus completely isolated at the present time from other areas of similar fauna, there is good reason to suppose that during a more or less remote period, of cooler climate, there was zonal continuity with the adjacent ranges and these in turn with the vast Boreal area believed to have once prevailed over the Great Basin region and to have included the Sierra Nevada. Changes in topography so modified meteorological conditions that the zones of life of necessity retreated northwards and upwards until restricted to the higher elevations now distantly separated from one another.

The mammals and birds of the high mountains of southern California in every case are either identical with, or show close relationship to, forms now existing in the Sierra Nevada.

In reviewing the Boreal biota as found to occur on San Jacinto Peak, the first thing to attract particular attention was the relative paucity of types as compared with the number of types in the San Bernardino Mountains previously studied (Grinnell, 1908). As shown in the accompanying table there are seven distinctly Boreal mammals and twenty-eight Boreal birds on the San Bernardinos, while there are but five mammals and twenty-two birds of like zonal restriction on the San Jacintos. Only one (*Mustela arizonensis*), out of the whole number belonging to the San Jacintos, has not been found on the San Bernardinos, and the probabilities point towards its existence there also. Otherwise all of the San Jacinto species are found on the other mountain mass. These relative conditions are closely paralleled in a study of the plants of the two areas (see Hall, 1902, pp. 47, 48).

This disparity in Boreal representation appeared to be without explanation, until it occurred to us that there might be some correlation between size of the areas concerned and numbers of

species inhabiting them. Obviously the San Jacinto area of Boreal is much smaller than that on the San Bernardino Mountains.

We proceeded to compare corresponding conditions elsewhere in southern California, with the results shown in the accompanying tables and diagram (see pp. 386, 387, and pl. 7). Examination of a zone map of southern California shows the Boreal zone to be represented in a series of isolated areas of varying limited extent, these in most part marking the crest of the main divide separating the desert and Pacific drainages.

From the Mount Whitney region of the southern Sierra Nevada this divide swings more and more to the westward until the vicinity of Mount Pinos is reached. Here it bends abruptly at almost right angles in a southeasterly trend, which is roughly maintained at least to the Mexican line. The diagram (plate 7) is constructed as though this backbone were in a straight line, and serves to show the relative extent of the isolated areas of Boreal included.

The Boreal life zone on San Jacinto Peak is seen to be larger in area than any others of the many mountain masses of southern California, excepting the San Bernardino Mountains; the number of Boreal types existing upon it exceeds those on any others of the mountains coming into the problem, excepting, again, the San Bernardinos.

It might be suspected that degree of remoteness from the very large Boreal area of the main Sierra Nevada would bear direct relation to number of species represented upon these detached mountains. According to this idea, the Sierras would have provided the mother fauna, and the farther the emigration of types along a possible line of dispersal, the fewer the survivors. Thus Mount Pinos would share with the Sierra Nevada a larger proportion of its species than any of the appropriate areas to the south. But we find no such condition in fact. There are two Boreal mammals and seventeen Boreal birds on Mount Pinos as compared with seven and twenty-eight, respectively, on the San Bernardinos, and five and twenty-two on the San Jacintos. Rather, does it appear that the number of forms is associated with the size of area concerned.

According to the hypothesis already expressed, the detached tracts of the Boreal zone on the mountain masses of southern California are inhabited by residual faunas representative of that which was spread continuously along the divide in earlier times. The facts show that fewer types have been preserved in one place than another, and further that the following statement of a possible law appears to be justified: *The smaller the disconnected area of a given zone (or distributional area of any other rank), the fewer the types which are persistent therein.*

Although formulated upon the basis of study in a restricted region we believe the above generalization will prove of wide applicability. Reference to the fauna of such a continental archipelago as the Santa Barbara group of islands, shows that, among themselves and as compared with the mainland, in richness of fauna as to species possessed (but *not* necessarily as to *individuals*), a very similar state of affairs exists. But this relationship must not of course be expected everywhere absolutely without exception, because of occasional extraordinary circumstances of overwhelming effect.

If our generalization is found to bear the test universally, then it is certainly fallacious to establish lines of dispersal and centers of distribution upon such data as the relative numbers of types found to occupy the regions studied, *unless size of the areas in question be taken into account.*

It is highly probable that the extinction of species (and thus, of course, of larger groups) has been hastened by restriction of habitat. Comparison of areas of similar climatic conditions, with regard to size and number of endemic forms (such as has been made in the present article), comes very near to proving this point.

The query arises as to the cause of more rapid disappearance of types in such cases, even though they may hold, each, unchallenged possession of a separate ecologic niche. This cannot be answered from positive data. But it seems inevitable that the smaller the area available to a species (whether a sea-girt oceanic island or a patch of the Boreal zone completely surrounded by Sonoran, as on the San Jacintos) the greater the chance for complete extinction of the species from such causes

as recurring periods of extreme food shortage, epidemic disease, and cataclysmic disturbances of either climate or topography.

Table (1) showing relative numbers of boreal mammals represented on the different mountain masses of southern California. Note the correlation of *numbers of types* with *size of the detached area* of Boreal (and Transition) zone in each case (see profile, pl. 7).

	Mt. Whit- ney Region	Mt. Pinos	San Gab- riel Mts. (not well known)	San Bernard- dino Mts.	San Ja- cinto Mts.	Santa Rosa Mts.	Cuya- maca Mts.
<i>Marmota flaviventer</i>	x						
<i>Callospermophilus chrysodeirus</i> ,							
subsp.	x	x			
<i>Eutamias alpinus</i>	x						
<i>Eutamias speciosus</i> , subsp.	x	x	..	x	x		
<i>Sciurus griseus</i> , subsp.	x	x	x	x	x	x	x
<i>Sciurus d. albolimbatus</i>	x						
<i>Sciuropterus alpinus</i> , subsp.	x	x	x		
<i>Neotoma c. cinerea</i>	x						
<i>Microtus m. dutcheri</i>	x						
<i>Microtus mordax</i> , subsp.	x	x			
<i>Thomomys alpinus</i> + <i>T. alti-</i>							
<i>vallis</i>	x	x	x		
<i>Zapus t. alleni</i>	x						
<i>Erethizon epixanthum</i>	x	x			
<i>Ochotona albatrus</i>	x						
<i>Lepus c. sierrae</i>	x						
<i>Canis lestes</i>	x			
<i>Vulpes necator</i>	x			..			
<i>Gulo luteus</i>	x			
<i>Mustela arizonensis</i>	x	x		
<i>Neosorex p. navigator</i>	x					..	
Total number of species	20	2	1	7	5	1	1

Table (2) showing relative numbers of boreal birds represented on the different mountain masses of southern California. Note the correlation of *numbers of types* with *size of the detached area* of Boreal (and Transition) zone in each case (see profile, pl. 7).

	Mt. Whit- ney Region	Mt. Pinos	San Gab- riel Mts.	San Bernard- ino Mts.	San Ja- cinto Mts.	Santa Rosa Mts.	Cuya- maca Mts.
<i>Dendragapus o. sierrae</i>	x	x
<i>Otus f. flammeolus</i>	x	.	.	x
<i>Xenopicus albolaryatus</i> , subsp.	x	x	x	x	x	x	x
<i>Sphyrapicus v. daggetti</i>	x	.	.	x	x	.	..
<i>Sphyrapicus thyroideus</i>	x	.	.	x	x
<i>Chordeiles v. hesperis</i>	x	.	.	x	.	.	.
<i>Stellula calliope</i>	x	x	x	x	x	.	..
<i>Nuttallornis borealis</i>	x	x	x	x	x	x	x
<i>Empidonax wrighti</i>	x	.	x	x	x	x	.
<i>Cyanocitta s. frontalis</i>	x	x	x	x	x	x	x
<i>Nucifraga columbiana</i>	x	x	x	x	x	x	.
<i>Carpodacus cassinii</i>	x	x	x	x	x	.	.
<i>Loxia c. bendirei</i>	x	x	..	x	x	.	.
<i>Leucosticte t. dawsoni</i>	x
<i>Spinus p. pinus</i>	x	x	x	x	x	x	.
<i>Zonotrichia l. leucophrys</i>	x
<i>Junco o. thurberi</i>	x	x	x	x	x	x	x
<i>Melospiza l. lincolni</i>	x	.	.	x	x	.	.
<i>Passerella i. stephensi</i>	x	x	x	x	x	.	.
<i>Oreospiza chlorura</i>	x	x	x	x	x	.	..
<i>Dendroica a. auduboni</i>	x	x	x	x	x	x	.
<i>Gerthia f. zelotes</i>	x	x	x	x	x	x	x
<i>Sitta canadensis</i>	x	..	.	x	x
<i>Sitta pygmaea</i> , subsp.	x	x	x	x	x	x	x
<i>Penthestes gambeli</i> , subsp.	x	x	x	x	x	x	x
<i>Regulus s. olivaceus</i>	x	.	..	x	x
<i>Regulus c. cineraceus</i>	x	..	x	x	x
<i>Myadestes townsendi</i>	x	..	.	x
<i>Hylocichla g. sequoiensis</i>	x	x
<i>Planesticus m. propinquus</i>	x	x	x	x
<i>Sialia currucoides</i>	x	x
	—	—	—	—	—	—	—
Total number of species	31	17	17	28	22	11	7

SONORAN BIOTA OF THE SAN DIEGAN DISTRICT
COMPARED WITH THAT OF THE
ADJACENT DESERT

The San Jacinto area includes a section of the divide between the desert and Pacific slopes of southern California. Only a small portion of this divide, however, is taken up by the Boreal zone (see pls. 6, 7). Over a large part of the area the Sonoran zones are continuous over the divide from the desert to the Pacific side. It is almost altogether the upper division of the Sonoran zone which tops the watershed, a narrow and diluted strip of Lower Sonoran extending over the low San Geronimo Pass.

While the Sonoran zone is thus continuous from the Pacific side over upon the desert, the fauna undergoes marked and rather abrupt change. To refer to basic causes, we may say that while aestival temperature is similar on the two slopes, degree of humidity is widely different. The great difference in *dryness* on the two sides of the San Jacinto Mountains is impressed upon the traveler in many sensible ways, so that recourse to a hygrometer is unnecessary to prove to him the nature of the change. Species and *genera* replace one another *up* the mountain, that is, from zone to zone, being segregated by temperature conditions; species and *subspecies* replace one another *across* the divide, from faunal district to faunal district, being controlled in their respective distribution by atmospheric humidity.

That the metamorphosis in biotic complexion from the Pacific to the desert is correlated with decrease in relative humidity is proved by the fact that replacement of species occurs on an average along the line where the obviously humid and dry areas meet. In the San Jacinto area studies of faunal behavior can be prosecuted under particularly favorable conditions, because this line of mergence between humid and arid faunal districts takes place within such a very short distance, and further because, while the Pacific side is not so very humid, as compared with the northwest coast belt of the United States, the desert side possesses an extraordinarily less percentage of humidity. The

degree of difference is so great that violent contrast is afforded in meteorological conditions and in their resultant effects on the plant and animal life.

The relatively semi-humid province occupying the Pacific slope of southern California has been termed the San Diegan District. The opposite slope leads down to the Colorado Desert, and this latter geographic name may be used for the faunal division which includes it.

The transition from semi-humid to extreme arid does not occur at the very summit of the divide at any point. Because of the prevailing westerly winds the San Diegan condition and biota are carried over upon the desert slopes to varying distances beyond the crest according to steepness and trend of the ridges which deflect the moist air-currents.

An analysis of the Sonoran birds and mammals of the San Jacinto area by species leads to the following groupings according to nature of distribution: (1) Species which occur regularly in both the San Diegan District and on the Colorado Desert, and which show no distinctive modifications in the two areas (see table A); (2) species which are separately confined to one or the other fauna, and so sharply delimited associationally that they do not even invade the strip over which the two faunas blend (see table B); (3) species which belong intrinsically to one or the other area but which penetrate across the strip of blending and even into the frontier of the opposite area (see table C); (4) species represented in each of the two areas, but by obviously closely related forms, either subspecies, or species but slightly differentiated (see table D).

The first category consists of species, all birds, of apparent indifference to conditions of humidity. They range for the most part widely over the western United States, and, with the notable exception of the cactus wren, either perform regular and extended migrations, or are of strong flight and vagrant inclination.

The second category comprises species which occupy very narrow ranges of environmental conditions, so limited that in some cases the confines of a single association are not overstepped. As examples of such extreme delimitation, *Dipodomys deserti*, of the aeolian sands, and the crissal thrasher, of the

mesquite belt, may be cited, as from the desert fauna; and the Hutton vireo, of the live oak association, and Bell sparrow, of the *Adenostoma* association, as belonging to the San Diegan fauna. These species must be of extreme dependence upon one or more factors of their surroundings.

The third category shows an intermediate degree of adaptability or indifference as compared with the first and second. In four cases species of prevalently desert habitat range over on the Pacific side of the San Jacintos, either continuously, as with *Lepus c. deserticola* and *Peromyscus m. sonoriensis*, or are represented within "islands" of the Lower Sonoran zone, as with *Ammospermophilus l. leucurus* and *Dryobates s. cactophilus* in the San Jacinto Valley. On the other hand, and in a greater number of cases, San Diegan species range to a considerable distance down over the arid side of the mountains, becoming thus exposed, in some cases, to an extreme of desert conditions. All those listed are of practically continuous range, except the San Diego song sparrow, the desert side colonies of this riparian species being of necessity cut off from their parent stock (see p. 279).

The fourth category includes some of the species classified in the third. These and the additional ones are peculiar in that there are complementary forms in the two contiguous faunas. Some of these blend together gradually over the neutral strip and thus in each case constitute subspecies of a common species, in accordance with the understanding of the term subspecies among American vertebrate systematists at the present time; for example, the Lower Sonoran *Perognathus panamintinus*, with its subspecies *bangsi* and *brevinasus* intergrading through San Geronio Pass. Others of the forms are connected by a broken series of intermediates (see under *Neotoma intermedia* and *desertorum*, pp. 336-347). In a few cases there are unquestioned hybrids of more or less frequent occurrence, as between the quails, *Lophortyx gambeli* and *L. c. vallicola*. And finally there are perfectly distinct though obviously closely related forms in the two faunas, as, for example, *Polioptila plumbea* and *P. californica*, and *Dryobates s. cactophilus* and *D. nuttalli*.

A

SPECIES WHICH ARE THE SAME IN THE SAN DIEGAN DISTRICT AND IN THE
COLORADO DESERT REGION

<i>Zenaidura m. carolinensis</i>	<i>Carpodacus m. frontalis</i>
<i>Cathartes a. septentrionalis</i>	<i>Astragalinus p. hesperophilus</i>
<i>Accipiter cooperi</i>	<i>Petrochelidon l. lunifrons</i>
<i>Buteo b. calurus</i>	<i>Stelgidopteryx serripennis</i>
<i>Speotyto c. hypogaea</i>	<i>Phainopepla nitens</i>
<i>Geococcyx californianus</i>	<i>Vireo b. pusillus</i>
<i>Chordeiles a. texensis</i>	<i>Icteria v. longicauda</i>
<i>Aeronautes melanoleucus</i>	<i>Mimus p. leucopterus</i>
<i>Archilochus alexandri</i>	<i>Heleodytes b. couesi</i>
<i>Calypte costae</i>	<i>Salpinctes obsoletus</i>
<i>Myiarchus c. cinerascens</i>	
<i>Empidonax t. trailli</i>	
<i>Corvus c. sinuatus</i>	
<i>Icterus c. nelsoni</i>	

B

SPECIES WHICH ARE SHARPLY DEFINED IN RANGE, ON EITHER THE DESERT
SIDE OR PACIFIC SIDE

<i>Desert (with no Pacific race)</i>	<i>San Diegan (with no desert race)</i>
<i>Ovis c. nelsoni</i>	<i>Perognathus c. femoralis</i>
<i>Citellus t. chlorus</i>	<i>Calypte anna</i>
<i>Peromyscus c. stephensi</i>	<i>Aphelocoma c. californica</i> (?)
<i>Thomomys perpallidus</i>	<i>Amphispiza belli</i>
<i>Dipodomys deserti</i>	<i>Vireo h. huttoni</i>
<i>Perognathus p. angustirostris</i>	<i>Chamaea f. henshawi</i>
<i>Perognathus spinatus</i>	<i>Baeolophus i. murinus</i>
<i>Icterus parisorum</i>	<i>Psaltiriparus m. minimus</i>
<i>Amphispiza b. deserticola</i>	
<i>Toxostoma crissale</i>	
<i>Auriparus f. flaviceps</i>	

C

<i>Desert species which range notably over into San Diegan conditions</i>	<i>San Diegan species which range over into desert conditions</i>
<i>Ammospermophilus l. leucurus</i>	<i>Citellus b. fisheri</i>
<i>Peromyscus m. sonoriensis</i>	<i>Peromyscus c. insignis</i>
<i>Lepus c. deserticola</i>	<i>Perodipus agilis</i>
<i>Dryobates s. cactophilus</i>	<i>Sylvilagus b. cinerascens</i>
	<i>Spilogale phenax</i>
	<i>Lophortyx c. vallicola</i>
	<i>Melospiza m. cooperi</i>
	<i>Pipilo m. megalonyx</i>
	<i>Pipilo c. senicula</i>
	<i>Toxostoma r. pasadenense</i>
	<i>Thryomanes b. charienturus</i>

D

TYPICAL DESERT MAMMALS AND BIRDS THAT MAY BE CONSIDERED AS HAVING RELATED FORMS ON THE PACIFIC SLOPE		PACIFIC SLOPE MAMMALS AND BIRDS THAT MAY BE CONSIDERED AS HAVING RELATED RACES ON THE DESERT	
<i>Desert or stock form</i>	<i>Pacific Coast race</i>	<i>Pacific Coast or stock form</i>	<i>Desert race</i>
<i>Onychomys t. torridus</i>	<i>Onychomys t. ramona</i>	<i>Citellus b. beecheyi</i> *	<i>Citellus b. fisheri</i>
<i>Peromyscus c. eremicus</i>	<i>Peromyscus c. fraterculus</i>	<i>Neotoma f. macrotis</i>	<i>Neotoma f. mohavensis</i>
<i>Neotoma i. desertorum</i>	<i>Neotoma i. intermedia</i>	<i>Thomomys nigricans</i>	<i>Thomomys calbezona(?)</i>
<i>Dipodomys m. similis</i>	<i>Dipodomys m. parvus</i>	<i>Perodipus agilis</i>	<i>Perodipus calbezona(?)</i>
<i>Perognathus p. bangsi</i>	<i>Perognathus p. brevinasus</i>	<i>Perognathus f. fallax</i>	<i>Perognathus f. pallidus</i>
<i>Lepus c. deserticola</i>	<i>Lepus c. bennettii</i>		
<i>Vulpes m. arsipus</i>	<i>Vulpes m. macrotis</i> *		
<i>Pipistrellus h. hesperus</i>	<i>Pipistrellus h. merriami</i>		
<i>Lophortyx gambeli</i>	<i>Lophortyx c. vallicola</i>		
<i>Dryobates s. caetophilus</i>	<i>Dryobates nuttalli</i>		
<i>Pipilo (aberti)</i>	<i>Pipilo c. senicula</i>		
<i>Toxostoma l. lecontei</i>	<i>Toxostoma r. pasadenense</i>		
<i>Polioptila plumbea</i>	<i>Polioptila californica</i>		

* Not found by us within the San Jacinto area, although well known to occur in the San Diegoan district.

THE BEHAVIOR OF GEOGRAPHIC RACES ON THE MARGINS OF THEIR HABITATS

In explanation of the diversity in behavior of geographic races on the margins of their habitats, as pointed out in the preceding section of our report, we may suggest that the direction of invasion of strains, whether from the desert towards the Pacific, or vice versa, may be dependent in part upon one or more of the following contingencies: (1) Continuity of the proper association from one side to the other. (2) Disproportionate representation of said association on one side as compared with the other, as for instance with the riparian song sparrow. (3) Lack of a complementary type on the opposite side, which would if present check invasion by competition; for example, the cases of the song sparrow and *Ammospermophilus*. (4) Unbalanced rate of dispersal in the representative races of the two abutting faunas; thus *Lepus c. deserticola* may have spread westwardly, through a period of time allowing for many generations, well into the margin of the habitat of *L. c. bennetti* because of greater "intra-specific vigor," the line of intergradation being thus forced over into the area where *bennetti* might be supposed to be best fitted to exist. According to this idea, in this and similar cases, unequal rate of distribution may carry one geographic race beyond the limit of its area of differentiation, and yet the frontier individuals, even for a considerable series of generations, maintain their original characters. The unequal "intra-specific vigor" may result from augmenting rate of reproduction, periodically reduced death rate (which would amount to the same thing), or from development innately of a greater degree of aggressiveness in disposition, as a specific trait—a proneness to wander, on the part of individuals. *Peromyscus m. sonoriensis* may be cited in the latter connection.

An assumption upon which the last consideration depends is contrary to the common conception among laboratory experimentalists, namely, that most if not all of the characters recognized by the systematic student of birds and mammals are somatic, subject to modification in the life-time of the individual or at least

within one or two generations. It is urged that should individuals be transplanted, say, from the desert to the San Diegan district, characters of color, quality of pelage or of plumage, size, and proportions similar to the race native in the new locality would promptly be acquired.

As an argument against this notion of the evanescence of subspecific characters, we wish to call attention to the numerous cases in Table C, where the ranges of forms extend in one direction or the other over into opposite faunal areas with their sharply contrasted conditions more particularly of humidity. Some of the mammals are of probably slow locomotion as regards home centers; so that many generations must have been subjected to the foreign environment to have allowed invasion to the distance attained. And yet in the extreme cases the characters of the stock form have been retained with no perceptible modification—an "experiment" in the laboratory of nature (see also table D).

As has already been made clear in the discussion on preceding pages, we cannot expect to derive universal laws for the behavior of species, to be applicable uniformly in any region like the San Jacinto area where two faunas meet. Perhaps the only general rule that can be laid down is that there *is no exact concordance* in the distributional behavior of all the animals of a region.

Upon reflection it is difficult to conceive of precisely the same set of delimiting factors operating upon any two species alike. The condition of diversity is thus explicable, as regards interfaunal invasion of individual species, degree of blending or distinctness between adjacent representative forms, and restriction versus cosmopolitanism in general distribution.

Possible generalities are as follows: That the more restricted as to association a form is in its distribution, the more liable is it to manifest the phenomenon of geographic variation. In other words the less adaptable a species the more chance for the action of the factor of isolation which is essential for the multiplication of subspecies, and hence of specific types. Operating to offset the effects of isolation are the processes of hybridization, and its probable climax, intergradation (see pp. 345, 374), which only long distance between differentiation centers can counterbalance (see Grinnell, 1904b, p. 372).

Where adaptable forms continuously through time and space invade radially towards one another, with but a narrow belt of intermediate conditions between the differentiation areas, specific distinction may be attained because of this very narrowness of the intermediate area. The intermediates being non-adapted and therefore relatively useless, would be eliminated. It is thus possible to account for the origin of such now separate forms as *Toxostoma redivivum* and *T. lecontei*, and *Dryobates scalaris* and *D. nuttalli*. These were doubtless not long ago intergradient forms, therefore subspecies.

By judicious observation it seems possible to select various degrees in the process of specific separation, on the margins of habitats. Some species are seen to blend perfectly, in others there is broken or mosaic intergradation, in others hybridization, as expressed in cases of fairly constant intervening type, and finally there are the distinct forms with no hybrids in evidence. In such a series we see the historical sequence in relationship preceding the "full species."

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PLATE 6

Map of the Life Zones of the San Jacinto area.

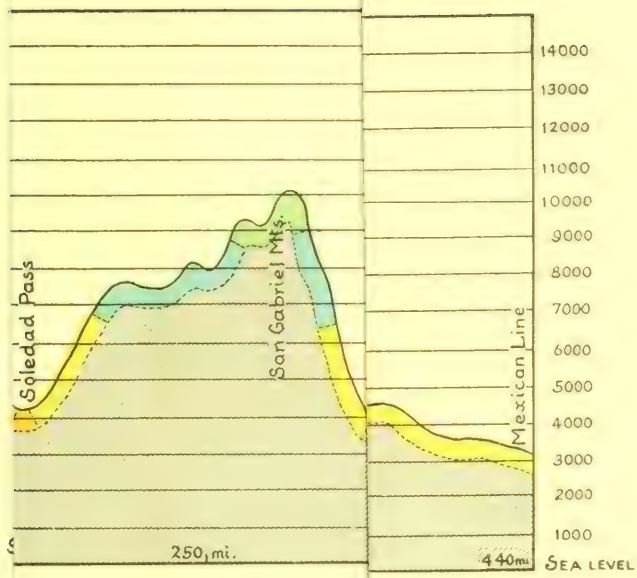


SAN



PLATE 7

Profile along divide separating desert and Pacific drainages, in southern California, from the high southern Sierras to the Mexican line, showing life zones. This profile is of course not in a straight line between the terminal points. Care has been taken to represent the life zones in their proper relative extents with due regard to total distance, as well as to altitude. The diametrical dimension thus shown may be taken as an index in each case to the area involved. This statement has been verified by comparison with an ordinary zone map of the region.



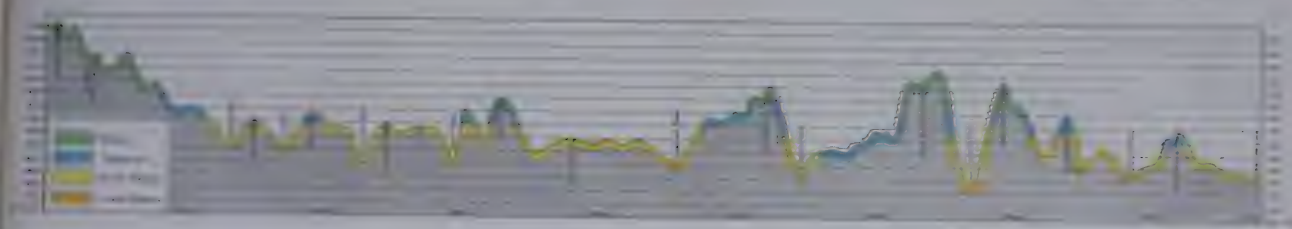


PLATE 8

Fig. 1. San Jacinto Peak, in back center, as viewed from Tahquitz Peak. The steep declivity in foreground rises from Strawberry Valley; at extreme right center is the edge of Tahquitz Valley. The patches of brush in the right foreground are chiefly composed of chinquapin (*Castanopsis sempervirens*) and manzanita (*Arctostaphylos patula*). Here is the summer home of *Passerella iliaca stephensi* and the forage ground of *Eutamias speciosus*, both being animals of the upper Transition zone. The trees on the ridge at the right are chiefly Jeffrey pines, those on the higher distant slopes are lodgepole and limber pines. The latter two are purely Boreal elements.

Fig. 2. Southeast wall of Strawberry Valley, showing lower Transition forest of black oak, incense cedar, yellow pine, and sugar pine, with silver firs of upper Transition on the higher portions of the slope. From this wooded slope were heard the notes of *Strix o. occidentalis*; other characteristic birds were: *Piranga ludoviciana*, *Nuttallornis borealis*, and *Xenopus a. gravirostris*.



Fig. 1



Fig. 2

PLATE 9

Fig. 1. Typical Boreal meadow at about 8200 feet altitude in Tahquitz Valley; photograph taken July 27, 1908. The conspicuous plant is *Feratrum californicum*, and living in its clumps were *Melospiza l. lincolni* and *Sorex ornatus*. The surrounding trees are Jeffrey and lodgepole pines and silver firs. In these were *Regulus c. cineraceus*, *Empidonax wrighti*, and *Sphyrapicus thyroideus*.

Fig. 2. Lower Palm Cañon near its mouth at the east base of San Jacinto Peak; altitude 800 feet above sea-level; photograph taken June 16, 1908. Washington palms, *Pluchea*, catclaw, and mesquite served to diagnose the locality as within the Colorado Desert faunal area. Some Lower Sonoran birds and mammals at this point were: *Icterus c. nelsoni*, *Auriparus f. flaviceps*, *Poliophtila plumbea*, *Lophortyx gambeli*, *Peromyscus c. eremicus* and *Pipistrellus h. hesperus*. In addition there was present along the stream the San Diego song sparrow (*Melospiza m. cooperi*), which was here resident under desert conditions of extreme type.



Fig. 1



Fig. 2

PLATE 10

Fig. 1. Portion of mesa at 3500 feet altitude near Dos Palmos Spring on the desert slope of the Santa Rosa Mountains close to the upper edge of the Lower Sonoran Zone; photograph taken May 27, 1908. In the background, on the shaded slopes, are such Upper Sonoran shrubs as juniper, Rhamnus, scrub-oak, and with them such birds as *Aphelocoma c. californica*, *Thryomanes b. charienturus*, and *Pipilo c. senicula*. In the foreground Lower Sonoran vegetation predominates, with such birds as *Amphispiza b. deserticola*, and *Helcodytes b. couesi*. Crossing this exact place was the line of traps which produced in a single night (May 30, 31) the following mammals: *Perodipus a. agilis*, *Dipodomys m. simiolus*, *Neotoma i. desertorum*, *Perognathus p. bangsi*, *Perognathus f. pallidus*, *Peromyscus c. eremicus*, *Ammospermophilus l. leucurus*, and *Notiosorex crawfordi*. Other mammals taken in the vicinity were *Sylvilagus b. cinereus* and *Peromyscus b. rowleyi*, thus showing the peculiar zonal overlapping at this point.

Fig. 2. Female *Vireo vicinior* on nest located 850 millimeters above the ground in bush of *Adenostoma fasciculatum*. The nest is seen to be supported not only at several points in the rim, but by the stiff twigs at sides and bottom. This was a species of extraordinarily limited range (see p. 291).



Fig. 1



Fig. 2

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